# The Builder.

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## ILLUSTRATIONS.


Catholic Church of St. John, Norwich.—Mr. Geo. Gilbert Scott, M.A., Architect ..... *Double-Page Ink-Photo.*
Design for a Frieze.—By Mr. Arthur Gwatkin ..... *Double-Page Ink-Photo.*
Three Houses in Hans-place, S.W.—Mr. Duncan Carmichael, Architect ..... *Double-Page Photo-Litho.*
The New Theatre, Cranbourne-street: Section and Plan.—Mr. Spencer Chadwick, Architect ..... *Two Single-Page Photo-Litho's.*

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### *Inland Water Transport in Germany.*

SOME time since we devoted an article to a consideration of the history and present state of inland navigation in this country.* It may be of some interest to supplement this by a review of the work which is being done in the same direction by Germany, the nation which is at present most actively employed in developing canal navigation.

During the interval of twenty years which have elapsed since the consolidation of the German Empire under the Constitution of April 16, 1871, the Germans have spared no pains to develop their manufactures, mining industries, and commerce, to keep pace with other countries, and, if possible, to outstrip their competitors. And the unification of Germany has given an enormous impetus to industrial development by the removal of conditions which greatly restricted the operations of commerce. The effect of this is well illustrated in regard to the railway system. Previous to this a traveller from Berlin to Carlsruhe, in the Grand Duchy of Baden, had to proceed *viâ* at least half-a-dozen distinct railway systems; and, to crown all, to find out the cost of freight for the carriage of a package, say from Königsberg to Metz, necessitated a struggle with the differential rates of nearly fifteen hundred tariffs! The Prussian Railway Law of 1838 was framed in a spirit indicating that the construction of railways would be more appropriately left in the hands of private enterprise, though reserving a considerable margin for State control.

This desire for a general Governmental control over traffic is equally manifested in regard to inland or canal navigation. In Germany there exists an association which is unique in its character. It is known by the title of "The Central Association for the Improvement of River and Canal Navigation." At a general meeting of this association, held on April 11, 1888, in the Reichstag Palace, Berlin, the composition of the association was as follows:—

| | |
|---|---|
| Municipalities | 38 |
| Chambers of Commerce | 37 |
| Societies of Watermen, Commercial Associations, Marine Insurance Associations | 37 |
| Affiliate Inland Navigation Unions | 12 |
| Individual members | 433 |

The nearest approach to this association to be found in this country is the Railway and General Traders' Association, the headquarters of which are in the Metropolis, established in 1882.

The object and aim of this Inland Navigation Association is to improve existing waterways in Germany and the States on its frontiers to the maximum degree of perfection modern resource will allow of, consistent with a due regard for economy. With such a remarkable association at work, the ramifications of which permeate the whole of Germany, no wonder that we find such remarkable developments of water traffic as are illustrated by the following figures, which were given by Herr von Sympher, Engineer to the German Government, in a paper read before the Fourth International Congress on Inland Navigation, held in the Manchester Town Hall in the autumn of 1890, entitled, "An Account of the Intercourse on German Waterways for the years 1875 and 1885":—

GOODS TRAFFIC ON GERMAN WATERWAYS.
(Excluding River-mouths visited by Seafaring Vessels.)

| | 1875. | 1885. |
|---|---|---|
| Traffic avenues: length (miles) | 6,214 | 6,214 |
| Tonnage ... ... | 20,800,000 | 27,600,000 |
| Net kilometric tons | 2,900,000,000 | 4,800,000,000 |
| Increase per cent., 66. | | |

GOODS TRAFFIC ON GERMAN RAILWAYS.

| | 1875 | 1885. |
|---|---|---|
| Traffic avenues (miles) | 16,467 | 22,791 |
| Tonnage conveyed ... | 83,500,000 | 100,000,000 |
| Net kilometric tons | 10,900,000,000 | 16,600,000,000 |
| Increase per cent., 52. | | |

Herr von Sympher thus summarises the comparison by the following:—

PROPORTIONS.

| | Traffic. |
|---|---|
| 1875. Waterways, 6,214 miles ... | 21 per cent. |
| Railways, 16,467 miles ..... | 79 per cent. |
| 1885. Waterways, 6,214 miles ... | 23 per cent. |
| Railways, 22,791 miles..... | 77 per cent. |

He observes with regard to the foregoing figures:—"A comparison of the figures shown in the above tables proves the extraordinary development of inland navigation within the German realm. . . . . In this growth the large rivers only show to any perceptible extent, namely, the Rhine, the Elbe, and the Oder. . . . . The smaller waterways, and others lying in less frequented routes, are, practically, at a standstill. The fact that the large capable rivers, which, besides being deepened, have greatly increased their traffic, is of the highest importance in considering the construction of new waterways."

In a memorandum prepared at the instance of the French Minister of Public Works, on "The Development of Inland Navigation in Germany," by MM. Holtz and De Mas, Engineers-in-Chief of Roads and Bridges, bearing date of October 3, 1888, in reference to the waterways of Germany, it is observed:—"Until recently little had been done in the way of extension of the system, yet most remarkable results had been obtained by the better turning to account of the existing water highways, inducing a considerable expansion of traffic, and the growth of river ports to such an extent that their equipments rival the great sea-ports." The truth of this reference to German inland ports is forcibly illustrated by the Rhine fluvial ports. This highly-important commercial artery, the principal German river, enters that country near Bâle, at an elevation of 755 ft. above the sea-level, and after a course of 512 miles, of which 431 miles are in German territory, falls into the North Sea at Rotterdam. There are no less than thirty-three river-havens on the Rhine in its course through Western Germany. After leaving Bâle, the Rhine traverses by four minor havens, namely, Kehl, Lauterburg, Leopoldshaven, and Spizer. At the confluence of the Neckar, which enters from the right bank of the Rhine, there are two river ports which, in effect, constitute one only,—Mannheim, which is on the south bank of the Rhine, and Ludwigshaven, immediately opposite, on the north bank of that river. The principal basin at Mannheim has two and a-half miles quay frontage. Three minor basins have about three miles of quay frontage on the aggregate. Including Ludwigshaven, there will be roundly seven miles of quay accommodation. The combined traffic of these twin ports in 1886 amounted to 2,400,000 tons. These two Rhine havens

* "Legislation as affecting the Administration of Waterways." See *Builder* for August 2, 1890, p. 79.

are situated 340 miles south of Bremen, the nearest German seaport. In the United Kingdom it would be difficult to find any point more than 100 miles distant from a seaport, this country being highly favoured in this respect by its insular situation in the Atlantic Ocean. After leaving Mannheim and Ludwigshaven, the Rhine proceeds by the minor havens of Worms, Rosengarten, Gemsheim, and Oppenheim, to Gustavsburg, and Mayence. Gustavsburg, which is on the north bank of the Rhine, opposite to Mayence, is a railway port, and in 1886 secured 430,000 tons of traffic as against 200,000 tons obtained by Mayence. Although the latter has much more extensive harbour accommodation than Gustavsburg, it is not so well connected with the railways by sidings, and, like Birkenhead, on the opposite side of the Mersey to Liverpool, Mayence is on the wrong side of the Rhine. Gustavsburg is only nineteen miles from Darmstadt, 137 miles from Dillengen, 154 miles from Solingen, and 156 miles from Strasbourg, all places engaged in the mechanical industries. To these places Gustavsburg is the nearest port, whether fluvial or maritime. The Port of Frankfort-on-the-Main, which is situated twenty miles eastward from Gustavsburg, where the Maine terminates, is worthy of special reference. It is an important illustration both of State identification with improvements of inland navigation and of municipal enterprise, and interest also attaches to that city as being the scene of the Third International Congress on Inland Navigation held in 1888. Up to 1885 the river Main had hitherto during the summer weather only had 3 ft. depth of water. The length of the river which required canalisation is 22⅜ miles between Frankfort and Gustavsburg, with a fall of 32·10 in. Regulation works have been constructed and five needle weirs and locks, each weir having a bye-pass for rafts and a fish ladder. The works have been carried out by the Prussian Government, and secure a minimum depth of 6 ft. 7 in. The navigation is entirely free from toll, and the works have been so constructed as to provide, if required, a depth of 8 ft. 3 in. Coincidently with the improvement works of the river Main by the Prussian Government, the city of Frankfort was occupied in the construction at its own cost of an important work, a Harbour of Refuge and Commerce (Sicherheits-und Handels-Hafen). This important work is formed by a widening of the Main in the reach between the Main-Neckar railway and the Neue Staats railway bridges. That portion designated as the Harbour of Refuge is situated on the right bank of the river, and is formed by a protecting outer dam parallel to the shore-line, and is equipped as well for commercial purposes, and is within a fraction of 10 acres in extent, capable of conveniently harbouring fifty of the largest Rhine boats. The minimum depth with movable dam down is 9 ft. 2 in. The Harbour of Commerce, extending on both sides of the river between the points already mentioned, has a water area of 30 acres, and, in addition to the quay-space thus afforded, there are quays on the reach, backed up by the Frankfort weir, above the Main-Neckar railway bridge, extending for five miles. The harbour is equipped with the most recent appliances, and there are extensive storage warehouses. These works were completed in the spring of 1887. The result was the expansion of the tonnage of 160,000, recorded in 1886, to the figure of 360,000 for the year 1887, as regards the harbour of Frankfort-on-the-Main, the figures relating to the tonnage conveyed on the river Main being in 1886 and 1887 respectively 236,000 tons and 664,000 tons.

With the exception of the river Danube, the German chief rivers all run from the south-east to the north-west. These are, namely, the Rhine, Weser, and the Elbe, which flow into the North Sea; and the Oder, Vistula, and the Memel-Niemen, which flow into the Baltic. The Danube trends south-easterly to the Austrian frontier.

The artificial inland navigations of Germany have been mainly constructed to enable intercommunication of traffic between the great river systems, and are chiefly to be found in North Germany. The two chief navigable rivers of Central Germany, the Elbe and the Oder, are placed in intercommunication by two inland navigation routes, which intersect near Berlin, and resemble the letter X, both traversing the Province of Brandenburg. One of these originates in the Oder at Hohensaaten, whence by the Finow canal, the river Havel, and the Clauer canal, the Elbe is reached near to Magdeburg. The second line of inter-navigation commences in the Oder, above Frankfurt, whence by the King William canal, which connects the Oder with the Spree, and that river uniting with the Havel near Brandenburg, the communication is made with the Elbe through the latter river at its *débouchement* into its waters at Havelburg. The distance by the first line of communication is 140 miles, as against 185 miles by the second route. These communications in their terminals extend on the Oder in the opposite directions of Stettin and Breslau, and on the Elbe in the contrary directions of Hamburg and Magdeburg. The Frederick William canal, which was made between 1662 and 1669, is now being superseded by the Oder and Upper Spree navigation, which is more consonant with the requirements of modern commerce. The length is 54½ miles; the bottom width, 46 ft.; water surface level, 76 ft.; depth, 6½ ft.; dimensions of locks, 180 ft. by 28¼ ft. by 8¼ ft. (depth of sill). The locks are to accommodate vessels of 400 tons cargo capacity. The German canal system, under existing conditions, permits of water transport between Hamburg and Breig on the Upper Oder. From Breig to Kosel the Oder is now being canalised by the Prussian Government. Germany is ready to extend the line of navigation from Kosel, which up to that point is intended to be completed by 1894, to the Austrian frontier, whenever Austria is ready to signify her willingness to complete the interval of 170 miles between the frontier and the Danube and Vienna. This would provide a through inland navigation between the North Sea and the Black Sea and the East generally, and would bring the coal-fields of Eastern Siberia into direct communication with Berlin. The distance between Kosel and Berlin is 353 miles. The prime object of the German Government is to promote the output from the Siberian mines in competition with the coals from the English mines and the liquids from Bohemia.

Another important step in this direction is being made by the Germans by the construction of the Dortmund and Emden canal, in order to develop the Westphalian coalfield and divert traffic from the Dutch North Sea ports, at a cost of three and a quarter millions sterling. The distance between Dortmund, which is in Munster, and the harbour of Emden, which is in East Friesland, on the Dollart, at the mouth of the river Ems, is 162 miles. It commences at Dortmund, and proceeds by the valley of the Emscher to Henrichenburg, 9¼ miles (where a branch to the Rhine extends for 5 miles to Herme), thence to Bevergen *viâ* Munster, a distance of 59½ miles to Papenburg, where the river Ems is entered, and extends for 19½ miles to Oldersum, the distance thence to Emden being 5¾ miles, making the total line of navigation 162 miles. The harbour of Emden, which is about one mile in extent, is being deepened and improved at a cost of 300,000*l*. Considering the length of the effective navigation as being 163 miles, the cost averaged per mile is roundly 20,000*l*., with a bottom width of 52 ft., a water-surface width of 78 ft., and a minimum depth of 6½ ft., and locks similar to those on the Oder and Upper Spree Navigation, excepting in the length, which will be 220 ft., or 40 ft. longer. This navigation will conveniently accommodate most of the Rhine traffic, for which it will find a new avenue to the sea in German territory. It will discharge an eminently useful function by forming a new route from South Germany and Switzerland to the Baltic ports. Considered with relation to the North Sea and Baltic Maritime Canal, which will shorten the distance between Emden and the Baltic by thirty hours, in addition to the advantage now enjoyed by Emden of being thirty-six hours nearer the Baltic than the Tyne ports are, and associated with the fact that the Dortmund and Emden navigation will certainly reduce the inland freight from the Westphalian collieries from the present lowest charge of 3s. 6d. per ton of coals by at least one-third—say to 2s. 4d. per ton, it is evident that the Northumbrian collieries, having severe German competition looming in the distance, will have to be on the alert. It is true that this new avenue through the Peninsula of Jutland will effect a saving for the Tyne ports of at least six hours; but against this there is another important factor to be taken into account, as it is the intention of our Teutonic neighbours across the North Sea to open this maritime canal as a free navigation to German vessels only, and charge a toll on all other vessels, which must necessarily handicap foreign competition. In the "Exposé des Motifs" attached to the measure relating to this interoceanic canal, when brought before the Reichstag for sanction, military and naval exigencies were put forward as the primary motive for its construction. The Germans have nevertheless been also influenced by commercial considerations to a large extent. The estimated cost of 7,950,000*l*. is allocated as between the Kingdom of Prussia and the Empire of Germany in the respective sums of 2,478,000*l*. and 5,472,000*l*.

The North Sea and Baltic Canal, which is now approaching completion, commences from the estuary of the Elbe, about 3 kilomètres above Brunshüttel, and proceeds by the Ludensee and Gieselau valleys to Wittenbergen on the Eider, thence follows the course of that river by Bendsburg to Steinrade, where it merges into the Eider canal, which enters the Bay of Kiel at Holtenau, the length of navigation being fifty-three nautical miles. The depth is being made 27 ft. 10 in., the floor width 85 ft. 3 in., breadth of water surface 196 ft. 10 in. There will be large sea-locks at either end, and the entrances are being guarded by strong defensive works at a cost approaching 500,000*l*., which forms part of the estimate of 7,950,000*l*. It will shorten the passage from Hamburg to the Baltic by forty-four hours, from London by twenty-two hours, and from Hull by fifteen hours.

The North Sea and Baltic Canal will render signal service as providing direct intercommunication between the two great German naval arsenals of Wilhelmshaven and Kiel. In proceeding *viâ* the Skaw by the Skager Rack, the Kattegat, and the Sound, there are hundreds of vessels wrecked and human lives lost, in addition to property exceeding half a million sterling yearly sacrificed in voyaging. All this serious loss and inconvenience will be saved by the new avenue, which will not only ensure security of life and property, and economise time, but will also effect in addition a considerable saving in pilotage, marine insurance premiums, and other charges. It is expected that out of the 40,000 vessels which yearly traverse the Skaw route to and from the Baltic Sea, at least 22,000 will utilise the new route. The dues, which include pilotage, lighting by electricity, and tug fees for sailing vessels, are fixed at 75 pfennigs, equal to 9d. per registered ton. As there is no maritime avenue *in esse* or *in posse* but where the mercantile fleet of Britannia will penetrate, and, as regards volume of traffic, be in the van, it may reasonably be presumed that, as in the year 1890 one-tenth of the international sea-borne tonnage frequenting the ports of the United Kingdom was in intercourse with Germany, and formed about one-third of the foreign sea-borne tonnage of that country, that the patronage of the United Kingdom will form a very sensible proportion of the traffic of the North Sea and Baltic Sea Ship Canal. The number of

vessels entering and clearing at the ports of the United Kingdom in 1890 was 136,011 with an aggregate tonnage amounting to 74,383,869, of which 14,523 vessels and 7,225,010 represented the arrivals from and departures to Germany, or one-tenth of the whole.

Although the North Sea and Baltic Canal will prove an inestimable benefit to Germany, both in a political and commercial sense,—Lübeck, that ancient city and port, one of the four Free Cities, and formerly the capital of the Hanseatic League of eighty-five commercial cities, which now sustains severe competition from the Port of Kiel, will probably suffer more seriously in this respect, as Kiel is really the Baltic sea-gate of the new overland route. In order, as far as practicable, to allay this grievance of Lübeck, it has in principle been decided by the Reichstag that another canal passing through Holstein connecting the Trave and the Elbe, about forty-five miles in length, is to be constructed at the expense of the State.

Horse haulage, which is still prevalent in the United Kingdom and France, is scarcely known in Germany, steam being the predominant factor. On the Rhine, towage by steam tenders is the most in vogue. On the Elbe, the Havel, and the Spree this system is in use, but is practised concurrently with that method of towage performed by a bottom drag chain, the latter mode being especially resorted to on those rivers when the currents are strong and rapid. On the Elbe the chain towage system is in operation from Hamburgh to Bohemia, a distance of 450 miles. On the Havel and the Spree, in those portions where they broaden in the great plain of Brandenburg, and form extensive lakes, the sail alone is used. The aggregate tonnage of the vessels employed on the inland waterways of Germany exceeds that of the mercantile fleet registered as belonging to the respective ports of that country, while there a large number of carrying companies on the waterways with their own steam tenders for the propulsion of boats, and also screw and paddle steamers carrying freight and passengers. The means of traction, whether by steam tenders or by the bottom chain, are furnished by extensive associations which, having at their disposition ample resources for traction, can offer the regularity and efficient service afforded by organisation. The tariffs of these societies, which are governed by ordinary competition, are very moderate. In a Commonwealth such as Germany, where the very idea of a toll levied with a view to the derivation of profit is entirely repudiated, it is not surprising to find the cost of transport by water reduced to a remarkably low figure. On the Rhine the mean cost of freight per ton per mile in ascending the navigation is ·168d.; the mean cost when descending is ·107d. On the Elbe, ·153d. per ton per mile is considered the maximum cost, while on the Havel and Spree, on low class traffic, such as minerals, where sails can be used, the mean cost is only ·032d. per ton per mile. As regards ordinary merchandise, there is only one waterway in the United Kingdom which can at all approach the foregoing rates of freight, and that is the Aire and Calder Navigation, where there are convoys or trains of boats, taking in all 440 tons at one lift through a lock, the compartments being usually eleven in number, and having the appearance of a long caterpillar. There the mean cost per ton per mile on ordinary goods as averaged for freight, ·143d., and in the case of minerals, the freight, including the return of empties, has only averaged ·119d. per mile. These figures, taking into account the lesser rate of wages in Germany, and the exceptional conditions under which their waterways are worked, may be considered about the lowest practicable which can be hoped for in this country.

There can be no doubt that one of the principal causes permitting the economical rates on the German waterways is the extended application of steam towage in that country. Herr von Sympher, in a comparison of the relative growth upon the waterways of France and Germany between 1875 and 1885, the figures for the latter year being 2,450,000,000 tons kilometric on a system of 12,400 kilomètres for France, and for Germany 4,800,000,000 tons kilometric on 10,000 kilomètres, observes, after pointing out that during the decennial period Germany had risen to double the volume of traffic on waterways, as compared with France: "In size of waterways, then, as well as in their economic value, Germany may be considered first in Europe, though it may not be before Russia, whose statistics are not fully published."

The subject is of more than economic importance, since there can be no question that the greater the growth of commerce which promotes international and common interests and sympathies, the greater is the guarantee for the peace of the world.

## NOTES.

WE presume that the authorities of the Institute of Architects decided to take no official notice of Mr. Norman Shaw's attack on them in Wednesday's *Times* under the heading "Architecture—A Profession or an Art?" as no reply appeared in the following day's paper; and certainly the columns of that essentially Philistine journal are hardly the place for the discussion of such a subject. We fear the President of the Institute left a weak spot for attack in dividing architects into three classes—artistic architects, constructive architects, and architects "who are *par excellence* men of business." That will not do. Every architect ought to be all three, taking the word "man of business" in the sense of being a man who attends to and carries through with regularity all the business details necessarily connected with the execution of a building; a qualification in which some "artistic architects" are lamentably deficient. But the position of Mr. Norman Shaw and the art-clique is equally open to question. They maintain that architecture is an art "precisely on the same footing as painting and sculpture." Then we beg to say that they do not know what architecture means themselves. To make that claim for it is giving it too much in one sense and too little in another. It is *not* an art of the same artistic expressiveness as sculpture and painting; it *is* an art inextricably bound up with plan and construction; plan and construction are *part of* architectural design, and those who do not recognise that are only architects in a one-sided fashion. Probably the two most remarkable and satisfactory buildings in London of which we know the architects are St. Paul's and the Houses of Parliament. The architects of both these were constructors and men of business as well as designers of architectural detail; Barry even openly expressed a contempt for architects who were not men of business. Mr. Hamerton, in this month's *Portfolio*, speaks of modern French architecture as the most living architecture of the day, and therefore the most interesting to study; and though Mr. Hamerton is no great authority on architecture he is most certainly not a Philistine, and is on the artistic side of things generally. Yet the French architects, so far from adopting the view of the English clique referred to, have recently actually emphasised their idea of the necessity of business qualities in an architect by demanding the establishment of a professorship of building accounts at the École des Beaux-Arts. The insinuation made by Mr. Norman Shaw that the Institute are only acting in their own interests is the most absurd of all. In what sense are they doing so? They are simply establishing that membership of their body shall mean the possession of competent practical knowledge. The artistic power of architects will be judged by the public as it is judged now, by their works. What strikes one more than anything, perhaps, is the ill-natured and ungenerous spirit of the insinuations contained in Mr. Shaw's letter as well as in the "memorial" referred to, and the satisfaction which "art-architects" seem to take in attributing mean motives to every one who disagrees with them. If they would be a little more reasonable, logical, and charitable, they might do real good. As it is, their tone and temper too often remind us of what some one said about Irish politicians—"They don't know what they want, and they will never be satisfied till they get it."

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IT is a matter for congratulation to all concerned that the engineers' strike in the North came to so speedy an end. It is equally satisfactory to know that an understanding was arrived at without the hands of the employers being too closely fettered in the matter of overtime; their undertaking to discourage it as far as possible being accepted, and a code of rules mutually agreed upon for the regulation of unavoidable overtime being adopted. A singular feature in connection with the settlement of the dispute may be found in the fact that rather more than half of the men to whom ballot-papers were issued declined to vote upon the proposals at all. Those in favour of their acceptance (3,511) represented but 54 per cent. of the number actually voting, and only about 23 per cent. of the number entitled to do so. Probably many who abstained from voting entertained certain objections to the terms of settlement, but at the same time were unwilling to take the responsibility of rejecting them, and thus keeping themselves and others out of employment for an indefinite period. It is difficult to account in any other way for a man declining to assist in arriving at a decision upon matters of such vital importance to himself.

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THE case of Burstal *v.* Bianchi, tried last week by Mr. Justice Charles, is yet another warning that no sensible man should take a house without having the drains examined by a competent authority. The usual facts were alleged by the plaintiff in this case,—a representation by the defendant that the drains were in good order, whereas, as was alleged by the plaintiff, they were in bad order. We use the phrase "as alleged" advisedly, because the judge decided the case on a legal point, before the facts were proved on either side by witnesses. Without entering into the technical point, it may be desirable to observe that it was clearly the opinion of the presiding judge that any terms as to drainage should be incorporated in the lease or agreement. This, no doubt, is sound advice; but every day instances are continually forthcoming that no amount of advice will prevent men from acting in a very foolish manner, and trust to chance in the most serious affairs of life.

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THE case of Moir *v.* Williams, decided by the Court of Appeal on Tuesday, settles an important point in regard to the fees of district surveyors in the Metropolis. Are they entitled to charge one fee or several fees in respect of a single large building divided into flats or chambers? According to the Metropolitan Building Act, 1855, a fee is payable in respect of "every building" which may be surveyed. The Court of Appeal has held that such a building as is mentioned above is a single building, in respect of which one fee only can be charged. This decision might have been anticipated; but it is still as well that the Court of Appeal should have settled it once for all, having regard to the increase in the number of what may be called divided buildings in London.

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DR. T. KOLLER, of Munich, has lately published particulars of some observations he has made on the best means of giving a weather-proof covering for the walls of buildings. He recommends the use of common salt in whitewash, the discovery of which was due to a curious accident. A man en-

gaged in whitewashing in a private house upset a box of salt which was used for cooking purposes. In order to conceal the accident he swept all the salt into his pail. It was afterwards found that the whitewash had set as hard as cement, and could be scrubbed without coming off. This led to experiments being made, the brick walls of a well, which was used for conveying light, being covered with the salted whitewash by a syringe. The experiment turned out very satisfactory, the wash being "as good as ever" after the lapse of four years. Dr. Koller attributes the action to the fact that the salt absorbs water, and the lime in the whitewash is, therefore, able to combine with the carbonic acid of the atmosphere, which thus forms a hard and durable coating. For buildings much exposed, a solution of melted paraffin in three parts of heavy coal-tar oil is recommended. This paint must be kept fluid while it is being applied. The best way to effect this is by keeping the vessel which contains the mixture in a pail of hot water. "Water-glass" is a material which has become entirely discredited of late, and this Dr. Koller attributes to the fact that its use has not been properly understood. In using water-glass, two points must be observed; first, the plaster must be of good quality, that is, of uniform texture, very hard, and very thin; and, secondly, the plaster must be well dried, as otherwise the calcic-hydrate decomposes silicates. The following is the way in which the composition should be applied:—Ten parts of sharp, dry sand, three parts of air-slaked lime, two parts of chalk or pulverised limestone, and soda water-glass of 33 deg. Baumé are taken. The sand, lime, and chalk are passed through a sieve in a dry state. The water-glass is diluted with twice its weight of water, and the other ingredients are then mixed with it until it is about the consistency of mortar, after which it may be applied to the wall surface. In a day or two the mixture becomes a coating as hard as stone, after which further applications of the water-glass may be made. Fuller particulars of Dr. Koller's investigations may be found in *Glasers Annalen fuer Gewerbe und Bauwesen*, 1891, p. 71.

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THE new Bankruptcy Buildings,—practically an addition to the Law Courts, though not joined to them,—are almost complete. We would, therefore, strongly urge on the consideration of the authorities the urgent need of enlarging Portsmouth-street, as the small street leading from the south-west corner of Lincoln's Inn-fields is called. If this were done there would be a fairly convenient approach to these new buildings, which at present are very inconvenient of access. An improvement equally urgent is the making of a roadway from Holborn to Lincoln's Inn-fields at their north-east corner. There is already access for foot-passengers. If this small piece of roadway were made, there would then be a straight approach from Holborn to the Carey-street entrance of the Law Courts. Traffic from the north to the Bankruptcy Courts would likewise pass through this opening, and the block of traffic at the top of Chancery-lane would be considerably lessened. There is nothing more extraordinary than the way in which public buildings are erected without due regard being paid to the access to them.

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MR. M. A. HOWE, of Boston, has for some time past been making a systematic series of tests of American vitrified sewer-pipes made by different manufacturers. The standard tests were five in number, and consisted of:—1. The hydrostatic test, for bursting and tensile strength. 2. The drop test, to ascertain the resistance to percussive force. 3. The concentrated load test. 4. The uniform load test, which shows resistance to external pressure. 5. The cement joint-test, made by hydrostatic pressure. For the drop test the pipe was supported by two pieces of pine, 16 in. apart, and was struck midway by a falling weight of 18 lbs. The height of fall was 12 in., 18 in., 24 in., and 30 in., at each of which five falls were made. For the concentrated load test the pipe was supported in the same way, but the load was applied gradually in the centre. For the uniform load test the pipe was placed in a box filled with sand, and pressure was applied to the pipe by means of a wooden block. In the hydrostatic tests and cement joint-test a hydraulic pump was used. The samples of pipe tested varied from 3 in. in diameter to 12 in., 18 in., 20 in., and 24 in., the thickness being from ½ in. and 1 in. to 2 in. The average ultimate tensile strength of several sizes of pipes of the stated diameters, were the following in pounds per square inch: 4 in., 517·2 lbs.; 6 in., 677·8 lbs.; 8 in., 551·9 lbs.; 10 in., 701·7 lbs.; 12 in., 592·1 lbs.; 18 in., 529·0 lbs.; 21 in., 617·0 lbs.; 24 in., 856·0 lbs. Seventy-nine lengths of pipe were subjected to the drop test, and of these twenty failed at the first fall. Of forty-five tests with concentrated load, the 4-in. pipes showed an average of 4,100 lbs. resistance; 5 in. pipes, 3,100 lbs.; 6 in., 2,700 lbs.; 8 in., 2,400 lbs.; 9 in., 3,180 lbs.; 10 in., 2,200 lbs.; 12 in., 2,700 lbs.; 15 in., 3,300 lbs. The following are the average results of the uniform load test:—4-in. pipe cracked upon a pressure of 17,300 lbs. being applied to the sand in which it was packed; the 6-in. pipe gave way at 12,000 lbs.; the 8-in. pipe at 5,900 lbs.; the 10-in. pipe at 4,600 lbs.; and the 12-in. pipe at 5,000 lbs. Mr. Howe draws the following conclusions from his experiments:—that the average ultimate tensile strength of the material of American vitrified sewer-pipe is, at least, 6,000 lbs. per square inch; that the average pipe can safely stand any ordinary shock; that it can withstand a load of 2,000 lbs. on the middle when supported at points 16 in. apart; that it will stand the same load per lineal foot when bedded in sand; that cement-joints made with the ordinary spigot-joint are not safe when subjected to pressure unless the pipe is prevented from moving longitudinally.

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A REPORT has lately been made by M. H. Monod, in which he gives particulars of 333 schemes for the supply of drinking water, which have been inaugurated in France during the period from 1884 to 1890.* Of these schemes 207 are described as successful. In the more important districts twenty-one have had the death-rate diminished since the inauguration of the works, but in four cases no appreciable result appears. In the twenty-three successful districts the deaths from typhoid fever have been extremely small since the waterworks have been in operation. The report is one of great interest, and gives many valuable details. The subject of cost is also dealt with.

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A DRAFT BILL for legalising the National Registration of Plumbers has just been considered by a special meeting of the Limerick Committee held under the Presidency of the Mayor of Limerick, supported by the City High Sheriff, the Medical Officer of Health, and others. The Hon. Secretary to the Committee read the draft Bill, and explained that in principle it aimed at giving legal sanction to the work already done, and transferring to a General Council the powers and control hitherto exercised by the various District Councils and the Plumbers' Company. On the motion of Dr. Barry, Medical Officer of Health, seconded by Mr. R. Fogerty, C.E., after full discussion, the following resolution was passed:—

"That this meeting of the Committee for Limerick and District hereby approve of the principle of the Bill drawn up by the Worshipful Company of Plumbers, London, to define and legalise the system for the National Registration of Plumbers."

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THE *Scotsman*, in recording expressions of regret at the retirement of Lord Shand from the Chairmanship of the College Committee of the Heriot Watt College of Edinburgh, refers to that Institution as the "People's College," and adds "that it has taken an assured place as the principal Technical College in the country we have Lord Shand greatly to thank." This College was originated by James Watt, Leonard Homer, and others, about seventy years ago. Mainly through the exertions of Lord Shand a portion of the funds forming the Trust Estate of George Heriot was devoted to the purposes of the College, as being entirely in harmony both with the spirit of the pious founder and the wants of the time. It appears that between 1872-3 and the last session of the original Institution the number of students grew from 747 to upwards of 2,000, about which figure it had remained for several years, owing practically to the incapacity of the existing accommodation and resources to provide for more. The College, as endowed, re-organised, and extended, has now upwards of 5,000 students annually attending its classes. There appears, therefore, to be ample ground for the *Scotsman's* remark that the College may be said to have thoroughly fulfilled the objects which the Watt directors and the Heriot governors had in view, that, namely, of establishing "a College for providing technical and general education for the industrial classes of both sexes, on a scale suitable to the present and increasing wants of these classes in the city."

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THE School Board for London have just published their yearly schedule of sites and premises which they propose to secure for purposes of additional school supply. In some cases, the new ground will be taken for enlargement of certain existing Board schools. As a few of the sites are alternative, their net total amounts to 33 [24],* extending over a net estimated aggregate of 76,725 [39,854] square yards, or nearly 15 acres 3½ roods [8¼ acres]. The distribution of the sites amongst the several divisions gives an indication of the year's increase and spread of population, in regard to elementary school provision, in the various districts named. The fresh sites are thus apportioned:—City: none [one]. Chelsea: two [two], Church and High streets, Fulham; and part of Bagley's market garden, Fulham Palace-road. Finsbury: four [three], Hilldrop-crescent and Brecknock-road (an alternative site with that in Torriano-avenue, Camden-town); Ecclesbourne-road School; Blackstock-road School; and Richard and Trinity streets School, all in St. Mary, Islington. Hackney: six [two alternative], Millfield and Rusmore-roads, or Atherton-road, Clapton (alternative); Fisher's-place and Berger-road School; Hindle-street School; Catherine-street School; and Clarissa-street, Haggerston-road, School. Marylebone: six [four], Cromer and Harrison streets; Torriano-avenue and Torriano-gardens (alternative with the site named above), Burghley-road School; Camden-street School and Camden Hall in King-street; Holmes-road School; and Capland-street School, in Grove-road, St. Marylebone. Tower Hamlets: four [one], Deal-street, in Mile-end New Town; Priory-street, Hancock-road, and Franklin-street, in Bromley; Ricardo and Giraud-streets, and Woolmore-street Schools, in Poplar. Greenwich: three [three], Horn-lane, Greenwich; Glenmohr-place, and the Cosmopolitan Club, Charlton; and a market-garden in Abbey Wood-lane, Plumstead. East Lambeth: one [four, two being alternative], Gloucester-road School, Camberwell. West Lambeth: five [one], Leigham Court Estate, Streatham-hill; Hyde Farm Estate, Balham; Latchmere Board School (extension), Battersea Park-road; Wye and Mantua-streets School, Battersea; and Wyvil-road, South Lambeth-road School. Southwark: five [four], Fair and Artillery-streets School, Horsleydown; and, in Bermondsey,

* M. Monod's report appeared in *Le Génie Civil*, 1891, vol. xix., p. 224.

* The corresponding figures for last year are given within square brackets. To the schedule for 1890 should be added an enlargement of the Nightingale-street (Marylebone) school; thus making the net total of sites for that year twenty-four.

East-lane School; Rolls-road; Major and Tranton-roads, and Keeton's-road School. The last-named two are alternative sites. The three Greenwich sites range from 1¼ to 1½ acre a-piece.

MR. BARR FERREE, whose name will be remembered as an occasional writer on architecture in American magazines, is giving some lectures on "Christian Architecture" at New York apparently from a semi-religious standpoint. The lectures are on "The Basilica," "The Cathedral," and "The Monastic Orders," and, according to the syllabus,—

"These lectures present the history of architecture from the standpoint of Christianity. They are concerned with the influence of religion upon architecture rather than with the history of architecture as it is generally understood.

They treat of the modifying tendencies of Christian thought, doctrines, forms and ceremonies upon architecture, and show that the church building is a necessary and trustworthy index of the progress of religious thought.

This point of view is not usually taken in the study of architecture, and explains meanings and purposes rather than details of form and construction."

It may be of interest to see Romanesque and Gothic architecture treated from that point of view; one which we should have expected to see illustrated on this side rather than the other side of the Atlantic.

THE issue of *L'Architecture* for November 7 contains a useful paper by M. Charles Lucas, presented on November 4 to the Council of the Société Centrale, on the subject of artistic property or copyright in architectural designs, and consisting mainly of a *résumé* of what has been said and done in regard to this subject during the past few years. The paper was ordered by the Council to be printed. It is an interesting record of recent expressions of opinion on the subject, but does not point to any probability of the designs of actual buildings having copyright protection. Architectural drawings, of course, can be copyright, like other drawings, but we do not see how buildings can be.

## LETTER FROM PARIS.*

As already announced ("Foreign News," page 335, *ante*), the Minister of Public Instruction has taken every one by surprise in appointing, to succeed M. Larroumet as Minister of Fine Arts, neither a known scholar nor an art critic, but a young and energetic official, whose ability is indisputable. It was expected that the appointment will lead to a breaking through of the spirit of routine in the art department of the country, a kind of reform certainly needed. Meantime however, M. Roujon has fallen ill, and there is considerable anxiety as to his health. It is to be hoped that he may soon be recovered sufficiently to carry on the reforms which are looked for from his administration.

M. Charles Garnier's numerous friends have been anxious also about his health. He has been attacked by a nervous disorder which has necessitated very careful treatment, but is now reported to be on the way to entire recovery.

The inclement winter which has early set in is likely to be very prejudicial to the buildings in course of construction in Paris. Among these is the new Mairie of the Tenth Arrondissement, the foundations of which, at the angle of the Faubourg St. Martin and the Rue Château d'Eau, are in preparation, under the direction of the architect, M. Rouyer, whose design was selected from among those of ninety competitors. The façade will have a monumental aspect, with pavilions at the four angles, and an elegant campanile. The style adopted is that of the close of the sixteenth century.

Among novelties in Paris must be counted the completion of the audience-chamber of the Court of Appeal at the Palais de Justice, which has just been inaugurated. This chamber forms a large rectangle, lined with high wainscot designed in a plain and severe style. Opposite the principal entrance are carved the emblems of justice, the torch and the tables of the law. Above is a valuable triptych of the Flemish school of the fifteenth century, attributed to John Van Eyck, which formerly decorated the Parliament-house. This picture, picked up by A. Lenoir under the first Revolution, and exhibited at the Louvre under the name of Albert Dürer, was returned in 1811 to the Imperial Court, and by exceptional good luck had escaped the numerous fires which, from the seventeenth century to the present day, have devastated the Palais de Justice. Over the entrance doors reserved for the magistrates are four large allegorical figures, picked out with gilding, which date from the Renaissance period. The walls are covered with a blue-grey hanging. The ceiling is decorated with coffers and symbolical ornaments of much beauty and delicacy. In the centre a large painting by M. Bonnat is to have place.

The new chamber is certainly one of the largest and finest of the Palace, and does honour to the taste and ability of the architect, M. Daumet, who is only complained of for the abnormally large windows and the too great space between left between the Bench and the Bar.

The Ministry has been occupied with a legal project for establishing a museum fund, to be supplied by the price of entry, by gifts and legacies, and no doubt also by the sale of the crown diamonds. It is not likely, however, that the Parisian population will readily succumb to this anti-democratic project, and be willing to pay at the doors of the Louvre and the Luxembourg. They are not likely to forget that under the monarchy all the art-treasures of the country were freely open to them; and possibly the unpopularity of such a measure would even have the effect of reducing the very donations which are counted on to assist the proposed fund.

Donations "in kind," however, the national museums are never long without. The last is from a Frenchman resident in Egypt, Doctor Fouquet, who has sent an important collection of Oriental glass and terra-cotta, including some very curious examples of different epochs,—ancient Egyptian, Alexandrian, Arabic, and Mediæval. These objects will be exhibited shortly in a room in course of preparation for the collection of Oriental pottery.

In the museums such gifts are tolerably safe, but the works of art placed in the public streets continue liable to the attacks of an incomprehensible vandalism. Coustou's group of "La Rhône et la Saône," in the Tuileries Garden, is the last sufferer, and has just been seriously damaged. It seems incredible that the Direction des Bâtiments Civils should not have better watch kept over works which it is their office to protect.

On October 15 there was opened at the Palais des Beaux Arts the new competition instituted by the Municipality for the erection of a statue to Beaumarchais. 105 competitors responded to the invitation, among them many artists well known to the public—MM. Perrin, Cordonnier, Deloye, Granet, Desea, Sterner, and Allouard. The competition, however, was a remarkably commonplace one, and with a few exceptions the works submitted were quite deficient in originality or suitability. Most of the competitors did not seem even to have made any use of the numerous extant portraits of Beaumarchais in order to produce a likeness. The jury, however, retained the sketches of MM. Allouard, Clausade, and Lormier, and these three artists are to compete a second time, and to send in, in five months, a model one-third the intended size. The work selected will be cast in bronze at the expense of the city and placed on the Boulevard Beaumarchais, not far from the house in which the poet formerly lived.

The decoration of the Hôtel de Ville makes good progress. The composition by M. Puvis de Chavannes, "L'Été," which was in the last Champ de Mars Salon, has just been fixed in its place. Not far from that the picture by M. Laurens, "Louis XVI. à l'Hôtel de Ville," and that by M. Binet, "La Sortie," are in process of fixing. The ceiling by M. Gervex is fixed, as also the friezes of M. Cormon, the escutcheons by MM. Albert Maignan and Carrière, and the cupola paintings of MM. Henri Levy and Barrias. M. Carpezat, former collaborator with, and successor to, the lamented Lavastre, is continuing the decoration of the Salle des Fêtes, where the gilding already shows along the friezes and the voussoirs of the arches and around the white caryatides which support the cornice of the ceiling. The Municipal Council, which is deprived of the assistance of Ribot, has, however, retained in its collection one of his paintings, a small composition entitled "Chez l'Antiquaire." It cannot be said to be one of his best works, as his characteristic faults of exaggerated opposition of light and shade is present in a marked degree. It will be placed in the museum of Auteuil, and as the annual purchases are accumulating there is already talk of finding place for them in the Galliera Museum, which will be completed before the end of next year.

Among the projected works in Paris we must not forget the prolongation of the Rue Réaumur, necessitated by the intended construction of the Metropolitan Railway. The road will then abut upon the Place de la Bourse, and will cross some of the busiest quarters of Paris. It is an important piece of street improvement, for which some considerable acquisition of property will be necessary, and the Crédit Foncier of France has offered a loan of fifty millions of francs to facilitate a scheme which is considered of such public utility. The Minister of Public Works is only awaiting the final and decisive vote of the Municipal Council to arrange the carrying out of the Metropolitan Railway.

On the 4th inst. the public exhibition of the Envois de Rome was opened at the École des Beaux-Arts. There is no very remarkable work among them. There are drawings showing conscientious study, but the whole collection rather tends to confirm recent ideas as to the insufficiency of the studies carried on at the Roman school.

We may mention a few of the works. In the section of painting, M. Lebaye, a fourth-year student, sends a large picture entitled "Les Tusculanes de Ciceron." M. Danger (third year) has executed a copy after Leonardo da Vinci, and an interesting sketch entitled "Les Muses." M. Laurent (second year) sends a picture under the rather pretentious title "Le Poête voit sa Jeunesse passer"; and M. Thys (first year) has designed a pretty "Baigneuse" and adds a sketch after the antique.

In sculpture the marble group by M. Capellaro (fourth year) representing the Deluge, is not without vigour and harmony of composition. The "Fontaine de Jouvence," by M. Boutry (third year) is a graceful bas-relief in plaster. M. Convers (second year) has made a pretty composition entitled "La Cigale," and a bas-relief, "L'Enigme." M. Dessuelles (first year) sends a rather mediocre plaster bas-relief, "Ste. Cécile."

In the section of architecture M. Defrane (fourth year) has sent a fine drawing of the sacred enclosure of Epidaurus; M. Chedanne (third year) has executed a very interesting reproduction of the Malatesta chapel in the cathedral of Rimini, and various architectural fragments hastily sketched in water-colour with great ability. Lastly, M. Tournaire (first year) exhibits a series of water-colour drawings, not without talent, representing architectural fragments, and the two churches of Santa Maria and San Pietro at Roscanella.

The École des Beaux-Arts has awarded to M. Déchenard the "grande médaille" in Painting (the "prix d'émulation"); that in Sculpture to M. H. Lefebvre, and that in Architecture to M. Duquesne, pupil of M. Pascal. The Abel Blouet prize has been given to M. Jost, pupil of MM. André and Laloux, and the Jury prize (for construction) to M. Vassas, pupil of M. Ginain.

The Jury of the École also met a few days since to award the prizes in the first class of architecture. After examining forty-eight designs, representing "A Villa on an Island," they awarded second medals to M. Chifflot, pupil of MM. Daumet and Girault; to M. Renevey, pupil of M. Ginain; to M. Michelet, pupil of MM. Daumet and Girault; and to M. Gavet, pupil of M. Laloux. They then proceeded to the consideration of the sketch competition, of which the programme was "A Terrace," and among twenty-three sketches awarded three first and two second mentions.

The ruins of the Cour des Comptes are at last disappearing. The "Arts Décoratifs" are to replace these grim reminders of civil war, in a new building on the site, which will probably be finished in about two years' time. M. Moyaux, the architect for the work, wants 3,171,000 francs to complete it, which is certainly not an extravagant sum. He intends to preserve the façade of the old building, which is in a good style and is not much damaged by

* Unavoidably postponed from last week.

the fire. M. Moyaux's plans have received the general approval of experts who have seen them, and it is hoped that we shall soon see the walls rising within which the "Union Centrale" is to house its treasures.

This is the first month for a long while back that we have had no death to record in the art-world of Paris, a fact sufficiently rare and gratifying to be noted after the manner of Horace: "alboque dies notanda lapillo."

## INSTITUTION OF CIVIL ENGINEERS:

### PRESIDENT'S ADDRESS.

AT the opening meeting of the session on Tuesday evening, Mr. George Berkley, the President, delivered the opening address, in the first portion of which he gave a brief outline of the history of engineering. In the latter portion of the address Mr. Berkley touched more in detail upon American engineering work, on electric work, and (briefly) on sanitary work, more especially as regards London. This portion of the address we print, commencing with the general summary of American engineering work:—

"America appears especially to illustrate the rapid increase in engineering work consequent on the improved condition of the country. Its very remarkable manufacturing and commercial advantages have doubtless, to a large extent, produced the rapid development in the production of iron and steel and of engineering works. It is comparatively only a few years since the production of pig-iron in America did not exceed one-fourth of that which is now made in that country; the present amount exceeds by about 2,000,000 tons the total output of Great Britain. Appended to this address is a statement showing the general dimensions of the best furnaces employed in America and Great Britain, the temperature and pressure of blast used, and the quality of the ore smelted. It is difficult to make any comparison between the results in the two countries, or in various parts of the United Kingdom, but the examination of these figures may be found of some value to experts.

The most conspicuous difference between American and English practice is in the output from one blast furnace. The largest output in Great Britain does not seem to exceed 750 tons, while the largest in America equals 2,000 tons in the week; this may probably result from the quality of the ore smelted, as well as from the greater pressure of blast employed. It may be questioned whether this large output from a single furnace may not be obtained at some sacrifice of economy of fuel used, and of wear and tear of furnace. The production of iron in America now amounts to about 10,000,000 tons a year, which is wholly used within the country, showing a larger quantity of iron (300 lbs.) used per head of the population of America than in any other part of the world. In Great Britain, after deducting from its production of iron the quantity exported, the consumption equals only 250 lbs. per head of the population.

The large quantity of natural gas issuing from bore-holes sunk within about twenty miles of Pittsburg is conveyed to the town through mains about 16 in. diameter, which it is proposed to replace by mains of 30 in. diameter. The very large supply of oil obtained in a similar manner by boring holes of from 3½ in. to 7 in. diameter near the banks of the Allegheny River and elsewhere, from which about 27,000,000 barrels are annually obtained for use and exportation, are most important advantages to the country. A gas vein was struck in 1875 at a depth of 1,200 ft., and bought by the Natural Gas Company. The gas was conveyed through a 6-in. pipe seventeen miles. The pressure at the well was 119 lbs. per square inch. In 1883 the Pittsburg Plate Glass Company used natural gas as a fuel, and now few of the important manufacturers of metal or glass in that district use any other fuel. The quantity of gas is estimated as amounting to about 350,000,000 of cubic feet a day, which is equivalent to about 4,000,000 tons of coal a year.

The bituminous coal-field in Allegheny, Washington, Fayette, and Westmoreland, surrounding Pittsburg, is estimated at about 14,000 square miles, and to produce annually about 13,000,000 tons of coal. To the south-east, in a district known as Connellsville, about forty to seventy miles from Pittsburg, the coal is especially adapted for making coke; this district ranks next to Durham, in England, in its production of coke. The annual output being nearly 6,000,000 tons. There has also been a great development of mineral wealth in the southern portion of the United States.

Appended to this address is a statement of some of the larger bridges which have been constructed in America; of these the most important, both on account of their magnitude and their typical character, are:—

1. The St. Louis Bridge.
2. Brooklyn Bridge, which spans the East River, and connects New York and Brooklyn.
3. The Washington Bridge, at New York, carrying 181st Street over the valley of Harlem River.
4. The cantilever railway bridge, built a short distance below the Falls of Niagara, carrying the Michigan Central Railway.

1. The St. Louis Bridge, designed by Captain J. B. Eads, spanning the Mississippi at St. Louis, has been fully described by Sir Charles Hartley in his paper on 'Public Works in the United States.'

2. The Brooklyn Suspension Bridge was commenced in the year 1870. Including approaches, it is 5,989 ft. long, the centre span being 1,595 ft. 6 in. long, and 135 ft. clear height at centre. It consists of towers built on caissons, the roadway being suspended from four steel wire cables which pass over the tower, and are attached to plates held down by anchorages. It is suitable for promenade, carriageway, and railroad, the railway-cars being taken over by means of an endless rope, worked by three powerful engines. In the year 1889 the aggregate number of foot and railroad passengers was 37,150,460, the receipts from tolls amounting to about 221,000*l*.

The following statement of principal dimensions will show the important character of the work:—

| | |
|---|---|
| Size of anchorages = 129 ft. by 119 ft. at base ..... / 117 ft. by 104 ft. at top ..... | by 89 ft. high |
| Weight of masonry in anchorages ..... | = 60,000 tons |
| Size of caissons = Brooklyn 102 ft. by 168 ft. / New York 102 ft. by 172 ft. | |
| Height of roadway on towers above high tide ..... | = 119½ ft. |
| Height of ridge of roof stone above high tide ..... | = 272 ,, |
| Height from foundation to top ..... | = 349 ,, |
| Size of New York tower at top of caissons ..... | = 157 by 77 ft. |
| Size of Brooklyn tower at top of caissons ..... | = 151 by 59 ft. |
| Number of wires in strands of cable .... | = 278 |
| ,, strands in each cable ..... | = 19 |
| ,, wires (7 B. W. G.) in each cable ..... | = 5,296 |
| Strength of cable per square inch of solid section ..... | = 160,000 lbs. |
| Number of steel wire rope stays 1¼ in. to 2 in. in addition to cables ..... | = 100 |
| Strength of suspender ropes ..... | = 140,000 lbs. |
| Number of suspender ropes to carry roadway ..... | = 1,520 |
| Power of three engines to work endless rope for railroad ..... = 625 HP. / 400 ,, / 275 ,, | |
| Total weight of bridge ..... | = 14,680 tons |
| Approximate cost of bridge ..... | = £3,067,400. |

3. The Washington Bridge crosses the deep valley of the Harlem River, and connects two portions of the City of New York. Its total length is 2,375 ft.; its clear height 133 ft. 6 in. above the water of the Harlem River. It is composed of two steel arches each of 510 ft. span, springing from three granite piers. It carries a roadway of 80 ft. in width between parapets, having a 50 ft. roadway and two side walks of 15 ft. each. The three main piers are 40 ft. thick at the springing line of the steel arches, and 98 ft. long; they are built of granite, with concrete interior, solid up to the springing line of the steel arches and cellular above that level. Each abutment, 235 ft. in length, is formed of three semi-circular arches of masonry of 60 ft. span, with piers between them 13 ft. thick. Each of the steel arches is composed of six ribs, resting upon steel pins at each end 34 in. long and 18 in. in diameter. They lie in steel bearings carried by pedestals of steel plates and angles connecting with and bolted to the granite skew-backs. The rise from springing line to soffit is 91 ft. 11½ in. The six ribs composing each arch are of nearly uniform depth of 13 ft., and are formed entirely of web plates of mild steel three-eighths of an inch in thickness, with double flanges at top and bottom. Each rib is formed of thirty-four segments of such length as to give 14 ft. 11½ in. horizontally between the extrados of each segment, and the posts which carry the roadway are placed at the intersection of these segments. The floor is carried by vertical posts rising from each segment to the joints of the rib, the posts being of 2 ft. 10½ in. channels latticed at the sides; these posts carry the transverse floor beams, which are of plates and angles 2 ft. 6 in. deep under the carriage-way. The floor is formed of buckle plates 3 ft. wide and 15 ft. long. The floor of the roadway is of asphalt, and the side walks are formed of large bluestone flags. Mr. William R. Hutton was chief engineer of the structure, and Mr. Bogart superintended its construction.

4. Each end of the cantilever bridge at Niagara is made up of a section entirely of steel, extending from the shore nearly half way over the chasm. Each of these sections is supported near its centre by a strong steel tower, from which extend two lever arms, one reaching the rocky bluffs, the other extending over the river 175 ft. beyond the tower. The towers on either side rise from the water's edge, and between them is a clear span of 495 ft. The gap between the ends of the cantilevers (120 ft.) is filled by an ordinary trussed girder resting on the ends of the cantilevers. The total length of the bridge is 910 ft., and it carries a double line of railway. The foundations rest on solid rock. Four blocks of substantial masonry are carried up 50 ft. above the surface of the water. From these the steel towers supporting the cantilevers rise 130 ft. The shore arms of the cantilevers were erected on temporary scaffolding, and the cantilevers spanning the river were built out one panel or section at a time by means of large travelling derricks, and when completed the trussed bridge was swung across the gap of 120 ft., resting on the ends of the cantilever arms. The work was commenced on May 3, and finished within seven months on December 1, 1883. It was severely tested under the weight of eighteen heavy locomotives and twenty-four gravel cars, showing a temporary deflection of 6 in.

The proposed utilisation of a part of the water-power from the Niagara Falls is a subject of much interest. Many years ago it was brought to the attention of engineers by our late distinguished Member of Council, Sir William Siemens. Nothing practical was accomplished until 1873, when a canal was constructed from a point on the Niagara river, near the head of the rapids above the falls, to the vicinity of the bluff, which forms the shore of the river below the falls, and some six or seven mills have been built near the edge of that bluff, exhausting the capacity of that canal.

In 1886 a company was formed, and a charter from the Legislature of the State secured. The works now in progress are for the purpose of developing a very large amount of power, and also for providing means for its transmission to points at suitable distances, including the City of Buffalo, which lies twenty miles from Niagara Falls. For the production of the power, the water will be taken from the Niagara river at a point about one mile and a third above the Falls and rapids in the navigable part of the river, and conducted by a canal to wheel-pits supplied by short conduits. The outlet from these wheel-pits will be into a tunnel, which will serve as the tail race for the water from the wheels. The interior section of the tunnel is equivalent to a circle of 25 ft. diameter. The tunnel now being constructed will be about 7,000 ft. in length.

The difference of elevation between the water at the point where the canal leaves the upper river, and the water of the lower river at the portal of the tunnel is 217½ ft. With every allowance for the slope of the tunnel, and of the canal, and for the water going to waste, this tunnel will deliver sufficient water to secure about 100,000-h.p. constantly at the wheels.

The year 1891 is the centenary of the birth of Faraday, to whose genius and scientific research we owe the discovery of the principles, the knowledge of which has enabled engineers subsequently to obtain and apply electromotive force economically. This, therefore, is a fitting time to notice this form of energy, which gives to the engineer the power to supply the demands imposed by the conditions of commerce, and the wants of man, in the latter part of the nineteenth century. The subject has been admirably treated, and laid before the Institution in 1883, by six of its most distinguished members:—Preece, Bramwell, Siemens, Hopkinson, Abel, and Thomson, and is referred to at some length in the address of Sir George B. Bruce. Nothing remains, therefore, to be said respecting electricity or its useful applications prior to 1883. It may, how-

ever, be interesting to trace the progress which has since been made in telegraphy, telephony, electric lighting, and the transmission of power.

Daniell's, Leclanché, and bichromate batteries are still used at the Post-office, each form having a particular merit, and being applied as follows:—

The bichromate cells in the long Wheatstone and duplex circuits.

The Daniell's on medium and short duplex circuits, and

The Leclanché on needle and telephone circuits.

Accumulators or secondary batteries are being introduced; they have become practical and useful instruments. At the London central station, eighty secondary cells have replaced 1,500 ordinary batteries, and work 220 circuits.

Delany's multiplex system of working is now in use, by which six messages can be sent along a single wire simultaneously in each direction. The distance which words can be sent without the aid of a repeater, and the rapidity with which they can be despatched, are much increased by the use of copper instead of iron conducting-wires. The speed of working the Wheatstone circuit was, in 1883, two hundred words a minute; six hundred a minute can now be sent. Copper wire is now largely used on trunk lines.

The length of conducting-wires now laid, in England, for public telegraphic purposes is 174,633 miles; the length of line being 29,876 miles, and the number of instruments 13,470. The number of messages received in London in 1890 was about $5\frac{3}{4}$ millions; and in Great Britain, $66\frac{1}{2}$ millions.

It is also interesting to note that there are forty-eight miles of pneumatic tube, worked in connexion with the telegraph department, through which 120,000 messages are carried daily, at an average speed of about thirty miles an hour.

In Mr. Preece's paper, read at the meeting of the British Association at Cardiff this autumn, on the 'London-Paris Telephone,' it is stated that between these cities, a distance of 311 miles, 'speech has been maintained with perfect clearness.' Telephones are now used in many offices in large commercial towns, and their general adoption and successful operation seem to be assured.

Sir William Siemens, in his admirable lecture on 'Electrical Transmission and Storage of Power,' very clearly explained the earlier stages of the application of the principle discovered by Faraday to produce electromotive force, and also referred to the transformation of electric into mechanical energy, by making the dynamo serve as a power-receiving, as well as a power-giving machine. Since 1883 the usefulness of the dynamo and motor has been further developed, and their construction modified to suit different classes of work. The development has been chiefly due to the means adopted to reduce losses of energy by friction, by eddy currents, and magnetic leakage, as well as to avoid sparking. Friction arises mainly at the bearings, and increases with the speed at which the machine is driven, and with the work done. The eddy currents absorb a considerable amount of power, but they are reduced by the lamination of the iron core. The construction of the dynamo is now made as simple as possible, and the most suitable materials are used.

For the illumination of streets, in this country, electric light has not yet proved so successful as it may hereafter become. The great advantages obtained by its application to giving light to the interior of buildings, are not utilised in the same degree, whereas its greater cost has been felt as an objection. It is, however, understood that the streets within the City of London may shortly be lighted by electric arc lights. For lighting the interior of buildings, the coolness, freedom from smoke and vitiation of the air, combined with the convenience of application, will secure for electric lighting a great future.

The length of electric rail or tramways, now worked in England, only extends to about $26\frac{1}{2}$ miles; its most perfect application is perhaps that to the City and South London Railway, of which it is to be hoped a full description may, during this session, be submitted in a Paper by the engineer, Mr. Greathead.

Electrical welding of metals has only lately been practically introduced into England; it has, however, been in successful operation at Crewe, on the London and North-Western, and at Horwich, on the Lancashire and Yorkshire Railways, and in a few other works.

Another important use of electricity is the connexion of many parts of the world by submarine cables, of which there are now about 48,600 miles laid.

The transmission of power to great distances has recently been illustrated in Germany; 300-h.p. has been transferred from the falls at Lauffen to the Exhibition Grounds at Frankfort, a distance of 108 miles. Three copper wires, only 0·160 in. in diameter, fixed above ground on ordinary telegraph poles, conveyed consecutively three alternating currents of 15,000 volts and 13 ampères, so regulated that they followed each other rhythmically at intervals of $\frac{1}{150}$th of a second. These alternating currents, flowing in different phases, produced a rotating magnetic field at Frankfort, which actuated motors that worked pumps, raised water, drove dynamos, and illuminated a part of the Exhibition.

The requirements and the great energy of the people have led to a large use of electricity in America. There are in that country 1,765 central electric lighting stations, and between 6,000 and 8,000 isolated plants for buildings. These operate about 215,000 arc lamps, and about 4,650,000 glow lamps. There are 323 electric tramways at work, the length of which is about 3,278 miles, and over 4,000 cars are equipped with motors; these are wholly worked with overhead conductors. The tendency has been to increase the size of the generators used for electric tramway work, and the gearless motor having an armature fastened on the axle of the car, similar to that in use on the locomotives of the City and South London Railway, has been introduced.

Electricity has been applied successfully to lighting, haulage, drilling, and coal-cutting in mines, both in England and America, and its application for welding metals is steadily on the increase. There are now operating in the United States over one hundred welding plants, on many descriptions of work, including the welding of wire, various parts of carriages and bicycles, wheel tires 4 in. by $\frac{3}{4}$ in., ship chains up to 2 in. diameter, and conical shells and shrapnel for the smaller class of armour piercing guns. Their largest electric water-power station has recently been completed at Vrazie, in the State of Maine. The dam has a fall of 12 ft., and sufficient water to develop 6,000 h.p.

Sanitary engineering work will now be briefly referred to; but in doing so my remarks will be confined to the metropolis.

In Sir Joseph Bazalgette's interesting address, delivered in January, 1884, there was a diagram showing the death-rate in each year from 1843 to 1883. During this period the rate decreased from a mean of 24·8 per 1,000, during the decade ending 1850, to 22·5 in that ending 1880, and to 21·4 in the year 1882. To this diagram is added the death-rate during the last eight years to the end of 1890, which has averaged 19·52 per 1,000, showing a continuous reduction which it is fair to attribute largely to engineering work. It should, however, be observed that deaths are not wholly attributable to imperfect sanitary conditions, but are partly the result of climatic influences. This is proved by the fact that, during the last eight years, the rate of deaths in the winter half years has been at the rate of 20·9 per 1,000; while during the summer half-years it has been only 18·14 per 1,000 per annum, showing a difference, which is chiefly due to these influences, of 14 per cent. on the average death-rate. The average death-rate during a term of years may, however, be taken as an approximate measure of the sanitary condition of a town, and it may, I think, be assumed that this condition is proved to be more perfect when the air is purer, and the supply of water is ampler and more wholesome.

The main drainage works have not been materially altered since 1884; but improvements have been introduced into the working, to which may be partially attributed the reduced death-rate. During this time main thoroughfares have been opened which, besides being open spaces and conduits for currents of air, have destroyed groups of houses which, as inhabited, were unfit for occupation. Much greater attention has been given to prevent overcrowding of such houses, and for the provision of suburban dwellings, and the running of workmen's trains in connexion therewith, as well as generally to secure better drainage and ventilation within all new buildings. Unfortunately, it does not seem to be easy to ensure the repair or replacement of defective drainage and imperfect ventilation in old houses, or it is probable that the decrease in the death-rate might have been larger.

A copious and constant supply of pure water at high pressure is of primary importance for health and comfort. The best means of obtaining such a supply has repeatedly formed the subject of public enquiry and discussion, notably under the Duke of Richmond's Royal Commission in 1867 to 1869, in which members of this Institution have taken an active part. The extraordinary growth of the population of London has rendered further investigation necessary, as it seems doubtful whether a supply in all respects satisfactory can be wholly obtained from the present sources, owing to the pollution of the river waters consequent on the rapidly increasing population. More than one other source of supply has been proposed, from which, it is stated, an ample quantity of pure water can be obtained. A part of two of the suggested sources has already been utilised for Manchester and Liverpool, and part of another is proposed to be taken for the water-supply of Birmingham. It is therefore important that the question in relation to the metropolis should receive early attention.

From the experience of the past there can be little doubt that engineering work has resulted, and will, in the future, result from—1. The increasing requirements of mankind. 2. Greater scientific knowledge. 3. The capability of engineers to apply this knowledge for the use and convenience of man. These requirements of mankind are ever increasing with the march of civilisation, and scientific knowledge is advancing by rapid strides. It only remains for the engineer to utilise this knowledge to secure a sound position for the profession. It is desirable that this great Institution should take a prominent part in promoting the acquisition of scientific knowledge, and that with this view representative members should devote some of their time and talent, whenever an opportunity presents itself, to aid and encourage this object. By these means its reputation will, in my opinion, be maintained, its usefulness increased, and its best interests promoted."

## PITFALLS ON COMMENCING PRACTICE.*

"If an architect is to avoid extras, a clear, concise, and comprehensive specification is an absolute necessity; and it seems to me that the growing practice of entrusting it to a quantity surveyor is very much to be deprecated. An architect has not thoroughly thought out his building until he has written the specification for it. And when he has done that with great care, although not necessarily with great elaboration, he feels a sense of repose and confidence in the execution of the work, not to be attained otherwise. In a specification vague terms are expensive items.

To suppose a builder will adopt a better and more costly method of execution, unless you specify it, is to be too flattering to human nature; and to suppose that, even if you do specify it, he will execute it so, unless you see that it is done, is to show some ignorance of the builder-nature in particular. Of course, there are exceptions to every rule. Do not try experiments with new materials and inventions. Let others do that. If you do it, it will probably be at the cost of your client's pocket and your own reputation. And, above all, allow for contingencies. If a thing is absolutely perfect, except under certain circumstances, those circumstances are bound to arise. 'If you do not take an umbrella it is sure to rain.'

When the working drawings and specifications are complete, let your client have both to look through. Better to make a modification even at the eleventh hour than that your client should not be satisfied, or that the alteration should be made after the contract is signed. Obtain an expression of his approval if possible, it may help to relieve you of responsibility.

In connexion with the actual building there are a hundred possibilities of oversight, which may lead to consequences most disastrous to the architect's reputation, but which a little care and attention to details might have avoided.

Undoubtedly, the architect's position is a difficult one. Many are the operations in a

* Concluding portion of a paper by Mr. W. H. Bidlake, M.A., read before the Architectural Association on the 30th ult. (See pp. 351-353, *ante*.)

building enterprise, and many are the hands engaged upon it. Each is liable to error or neglect, and, however attentive the architect may be, it is impossible for him to be always inspecting the building. And so matters of error or neglect become covered up and obscured in his absence, even if they are not wilfully hidden from him. Yet it is he, and he alone, who must bear the responsibility before the public. And the public will not stop to inquire into the difficulties of his position. "What is the good of having an architect?" will be the contemptuous question. And, although his building is admittedly excellent in plan, design, and execution, yet all the good that he has done will not be remembered to him, if a chimney smokes, or the water comes into the cellar. This may be unjust, but it is a matter of experience.

It behoves the architect, therefore, to pay minute attention to the details of construction, arrangement, ventilation, and the like, and to be very sure he is using good materials. If he has not used good materials, time and weather will soon expose the fact to the public. A doctor may kill his patient, and the fact may be forgotten, for "dead men tell no tales," but an unsuccessful building will remain an abiding reproach to its architect.

A correct judgment of materials can only come by experience, and even the most experienced are sometimes at fault. It is, therefore, all the more necessary to make the question one of close study. It is a misfortune that the education of an architect does not comprise a study of the distinction between good and bad material. It is not enough to see a typical example of good timber or stone, but also to compare it with a bad example, and to mark the difference. Might not a museum of common building materials, *good and bad*, be a useful aid in the new educational scheme of this association? The chief drawback, perhaps, to such an idea would be the difficulty in getting the latter, owing to their rarity. Do not condemn material unless you are sure of your judgment. A little friendly consultation, in private, with a man of experience will be very valuable. Although it is folly to allow bad material, it is possible to be hypercritical. An architect, like blindfold justice, must hold the scales equal between builder and client.

It is a good rule to imagine the builder present in all your dealings with the client, and *vice versâ*.

Be sure of your foundations. Test the ground yourself. If you come to a soft part, have it cut out, and concreted, or the brickwork carried down; and step the brickwork from the higher to lower level. See that the footings are in, and have a greater spread where greater weight has to be carried. Beware of drawing off water from the foundations in sandy soils. It will be too late to think of these matters when the cracks of unequal settlement have appeared. Take the same precautions with drains. Have them tested in your presence. If they pass under a building, arch the walls over them; if they pass over new-made ground, carry them on concrete or on brick foundations. *See* that these things are done, and do not take the builder's assurance. The more a builder feels that a thing is wrong, the louder may be his assurance that it is right. Be sure that the damp course is in, and see that the brickwork is built solid round all smoke-flues in hollow walls. If smoke once finds its way into the hollow space, it will be impossible to find the leakage, and endless annoyance to the client may be the result. Examine every fireplace to see that joists and purlins are not built into the flues, or too near them. Tie in wall plates so that the roof will have no tendency to spread. See that roof principals have sufficient abutment, or efficient tie-rods. Take care that the mason has not cut the beds of a column hollow in order to obtain a fine joint, or the stones will fracture. If you have to argue yourself into the assurance that a beam is strong enough, you may take it, that your judgment says it is not; therefore, make it stronger. I often wonder at the intrepidity of some architects in the way they overhang their half-timbered construction on the ends of deal joists, of less scantling than the *oak* beams of old work; and I think that a good earthquake, or even a bad one, would make short work of much of the modern iron stanchion and girder scaffolding.

When the roof-tiles are being laid, take care that the mortar-bedding does not extend too far down. If it does, water will be conveyed through the roof, and drip on to the ceilings, and the client will write a letter to his architect acquainting him with the fact. The roof will have to be stripped. I do not think there is any other remedy. Take great precaution in plastering the interspaces between the rafters of church roofs, and allow a good air-space between the laths and tile-battens. Beware of internal gutters, and pockets where snow can accumulate. Carry chimneys well up, and give them some mass and breadth. The modern chimney is distinguished by its leanness. Guard against water soaking through brick sills, or driving under casements, or condensed moisture dripping from skylights. See that water-pipes are not exposed to frost, and do not trust any one but a thoroughly competent man to fix the kitchen cylinder, otherwise you will get into hot-water. Keep the gas-meter away from any source of heat, or the water will distil into the pipes, and there will not be a steady gas-flame in the house. Do not lay a wood block floor until the concrete bed is quite dry, or the wood will swell and the floor 'rise.' And, above all things, beware of *dry rot*. For a man who has spent a considerable sum in building a house to have to spend another £50 on new floors and skirtings before he can inhabit it, will prove a great strain on his composure; and it would be an even greater trial to a committee, which had collected its scanty funds with the greatest difficulty, to see them swallowed up by this seven-headed hydra without a murmur against the architect. Do not trust to caretakers; they are not to be supposed to have any intelligence. They will stop up the ventilation openings if they can, or else allow them to get choked with dirt. For the sake of your own reputation, urge your client or committee to have a periodic examination of all such air-inlets, and of the under floor-space. The latter can be arranged by having movable floor-boards screwed down. You might also take similar precautions with regard to running the water out of heating coils on frosty nights, and also with regard to domestic servants letting soap, hair, and the like get into sink waste-pipes.

I now come to what is, perhaps, the most frequent and insidious pitfall of all, the accumulation of 'extras.' On this subject, Mr. Blashill very kindly sent me a copy of a letter, in view of my paper to-night. The letter is to Mr. Decimus Burton, from Mr. J. W. Croker, and it expresses the matter so tersely that I should like to read it. It is dated August 12, 1829:—

'MY DEAR MR. BURTON,—Excuse the liberty I take,—prompted entirely by my regard for you,—of requesting your serious attention to the excess of the expenses of the Athenæum over the estimates. You are a young man, just making your way in your profession. You have many rivals, and, I dare say, a few whom I might almost call enemies. They will all watch with critical care your proceedings in this your first great work in town; and I need hardly tell you that, in public opinion, the worst character an architect can get is that he exceeds his estimates. All the excess may be not only *excusable*, but *proper* and right to have been incurred; but the world will not enter into details, and you will be generally spoken of by the thousand mouths of the Athenæum, and by the ten thousand mouths that will echo them, as "one who *exceeds* his *estimates*,"—a reputation, I repeat, the most likely of all others to be injurious to a young architect. I, therefore, implore you to exert all your ingenuity and influence in curtailing all possible expenses, not merely for the Club's sake, but for your own.—Yours truly, J. W. CROKER.'

Now, it is almost impossible to avoid extras, to some extent; but there is a reasonable limit beyond which they must not pass. Contingencies often arise which it is impossible for an architect to foresee, and no reasonable client would object to extras for such, even though he did not like them.

When, however, an architect, in order to improve his design, incurs a heavy extra for a modification in the plans which his client has approved, he incurs a serious responsibility, and he may find that he has to refund the cost of his indiscretion. It is the wisest course to keep your client fully aware of the extras as they arise, and to obtain his sanction first, to all those that are not quite trivial. If possible, obtain an estimate of extra work beforehand, and submit it to your client for approval; and insert a clause in the contract that all extra work is to be valued at the same rate as that on which the tender is based. It is certainly most unreasonable to spring a considerable extra expense upon a client, incurred by his architect without his knowledge.

In order to avoid any difficulty whatever, make the payment of extra work contingent, by the terms of the contract, on the architect's written order, and insist upon this procedure. At the same time, advise your client that he has no power to give any orders except through your agency.

It will avoid disputes if you afford both parties to the contract the opportunity to fully study its contents. I have been surprised to find it necessary to ask builders to read through an agreement before signing it. They sign 'in haste and repent at leisure.' For the architect himself, it is most important that he should be under no obligation whatever to either parties of a contract. He must not only be impartial, but give no occasion to the suspicion of partiality. Keep strictly to the terms of the contract, and avoid the law like poison. I will not notice the questions of dilapidation and valuation further than to point out the caution required in dealing with them. If the public is induced to invest its money in any enterprise on the strength of your valuation, and this should turn out to be altogether too visionary, you will have incurred a heavy responsibility. If you are doubtful on the subject, it is better to pay for good advice. There is danger in trying to be a universal specialist. Find good brains, use them, and trust them.

Before concluding, there is one more question to consider: That of giving certificates. Always keep good security, and keep well in view the contingency of the builder's failing before completing the contract. If you do not, you will have involved your client in embarassment. Be very cautious in giving the final certificate. It is the client's acknowledgment, through your agency, that the builder has completed his part of the contract, and it debars him from any further claim.

Pitfalls will come as long as it is human to err; but if an architect refrains from compromising his independence, pays attention to details, and never trusts to a verbal or ambiguous agreement, and will not allow himself to be persuaded against his judgment, he will avoid very many of them. It is easy to be wise after an event; to be wise before it is to learn from the experience of others."

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Mr. H. O. Cresswell, in proposing a vote of thanks to Mr. Bidlake for his paper, said it gave him very great pleasure to do so, for Mr. Bidlake had treated of a subject which was very near to the hearts of all young practitioners. They all experienced those pitfalls, and he supposed that there were few of them who had recently passed into practice who had not, in the course of Mr. Bidlake's remarks, heard something which came within their experience. Mr. Bidlake had said that one of their most serious pitfalls was that of exceeding the estimate, and he (the speaker) thought that there was not the slightest doubt that if they could only keep within their estimates they saved themselves a vast amount of trouble, and their clients a great deal of annoyance. He had, he supposed, in common with most young practitioners, in starting practice, frequently under-estimated, and he had found out the great mistake of doing so. He found now that it was far better to frighten a client at first, on the question of cost, than to have the trouble of cutting down the estimate afterwards. The client would invariably at first suggest a sum which was utterly inadequate to carry out what he required done, or, if he did not suggest a sum at all, he would invariably think the architect's estimate very much beyond the mark. He found it much better to let the client think so, and to frighten him at first, than to begin the work by stating one amount, and being compelled to keep on increasing that amount as the drawings were developed. Mr. Bidlake had also given them another piece of advice. He had said: "Avoid figures if you possibly can in stating amounts to your clients." That was an admirable piece of advice if it were practicable, but he (Mr. Cresswell) was afraid that none of them could carry it out. Their clients would have, and were entitled to have, from them as experts, an estimate before they committed themselves to a contract. A client came to the architect for the purpose of obtaining an estimate for a building, or to get him to state within a reasonable amount what a building would cost beforehand. He was afraid that, although it would be an ideal position for the architect not to be compelled to commit himself to figures, yet they must face that eventuality. They must recognise that it was due to their clients, and they must arrive at a proper estimate as nearly as they could; and if they were in any doubt as to the cost,

they should put the figure a little above rather than below the probable cost. Then another dangerous pitfall,—perhaps even a more dangerous one than that of exceeding the original estimate,—was that of "extras." He supposed that no building ever was executed without "extras," and he did not know whether one ever would be, unless the specification was crammed with provisional amounts. He did not know but that putting in provisional amounts was a very good method as long as they could get their clients to agree to it; but if they put in provisional amounts with too lavish a hand, they would find that when the first tender was received, probably the amount was very much higher than the client anticipated. No damage was done to the client by putting in a large provisional amount; and if the architect could execute a building for less than the original contract sum, the client would think him a very clever fellow. The advice which had been given to Mr. Decimus Burton expressed, as Mr. Bidlake had said, the matter as clearly as any one could possibly wish, and he thought that Mr. Burton's letter showed the opinion of the outside world of a man who did exceed his estimates; so that if they could execute their buildings for less than the original estimate there was a grand future before them.

Mr. E. Woodthorpe, in seconding the vote of thanks, said that with regard to what Mr. Bidlake had said about exceeding the estimate, there was no doubt that when a client began he was frightened very much by the figure of the estimate. But what the architect had to do was not to please the client so much at first, but to end his work well, besides beginning well. With regard to the liability of the architect to the builder, and the necessity for examining into the financial position and the respectability of a client, he remembered that a friend of his, a man who took a premium at the Royal Academy, was once called upon by a client. His friend did not know much about the client, but he got out drawings for him and invited builders to tender for the work. The builders knew his friend well, and thought the client was in a thoroughly solvent condition. The building went on, and the client, after getting money on a mortgage on the property, ran away. The builder then brought an action against the architect, and he, being quite a young man, was very much worried. He had to go into court, and went through a lot of trouble, but, mainly with the assistance of a barrister friend, he got off entirely. But he was so disgusted that he left architecture altogether, and enlisted in a cavalry regiment. Another important point was to get an agreement that was thoroughly binding. An ordinary agreement form, such as a great many of them used, was of no use for a building of any considerable size, so he was informed. He did not agree with Mr. Bidlake that it was not well to differ with a client. If the client wished the architect to do something which he did not consider right, the architect ought to make a firm stand; and he would find, in the case of a building committee, say, for a church restoration, that in the end his advice would be followed. With regard to party-walls, they should be very careful to serve party-wall notices in time, so as to give three months' notice and to leave time to arrange everything. With regard to ancient lights, they should not on any account attempt to steal a march over their neighbours by running up a building. Some men did such things; they said they were not going on with the work, though that very night they would get fifty men on the job and run a wall up. Such practices as that would get a client into difficulties. Mr. Bidlake's advice with regard to drainage was excellent. An architect should never let a drain be covered up unless he had seen it. With regard to smoky chimneys, it was difficult to tell how they came. They were often the result of the stuffing-up of every crevice in a room, so that the air could not get in. They could not stop that, but when they had finished up their work they should see that every little detail was thoroughly well done.

Mr. Arnold Mitchell said that there was a good deal of truth in what the last speaker had said about smoky chimneys; but attending to the building of one's flues contributed most materially to their non-smoking. In the School Board buildings of London one never saw a tall-boy or cowl on any single flue, partly, perhaps, because the floors were of a great height, and that contributed to a draught; and there were also air inlets in every room. But the Board made it a rule that all flues should be built of 9 in. brickwork externally. That was not only a much sounder mode of construction, and it kept the flues much drier. It would not cure smoky chimneys, but it would go some way towards preventing them. Mr. Bidlake had referred to a point to which he (Mr. Mitchell) thought they should pay great attention. He had said that they must be careful how they rejected materials. He (the speaker) had learnt that one must assume, or at least could not go far wrong in assuming, that all materials to begin with were not "the best," as always specified. They must certainly be careful what they rejected, but at the same time they should reject if doubtful. But if one did make a mistake, as one sometimes did, and rejected a good thing, it was unwise to adhere to it. It was better to confess to the builder that a mistake had been made. The question of "extras" was a fruitful subject of trouble. Everybody said so; but he thought that if one was sufficiently careful with one's drawings and specifications, "extras" need not come to a very large amount. In practice, he thought, most of them found that they might exceed their estimates to the extent of 5 per cent. Mr. Bidlake had also referred to the necessity of ensuring the accuracy of the drawings, and he (the speaker) thought they could all endorse that remark. Mr. Cresswell had said that it was not possible to carry out a building without "extras." He (the speaker) thought that was wrong; in fact, he knew it was, for he was in the fortunate position of having just finished a job which had no provisional sum and no "extras" in it. It was possible to do this if sufficient care were taken with the original drawings, and, what was more important still, if the details for the whole job were arranged before the contract was signed.

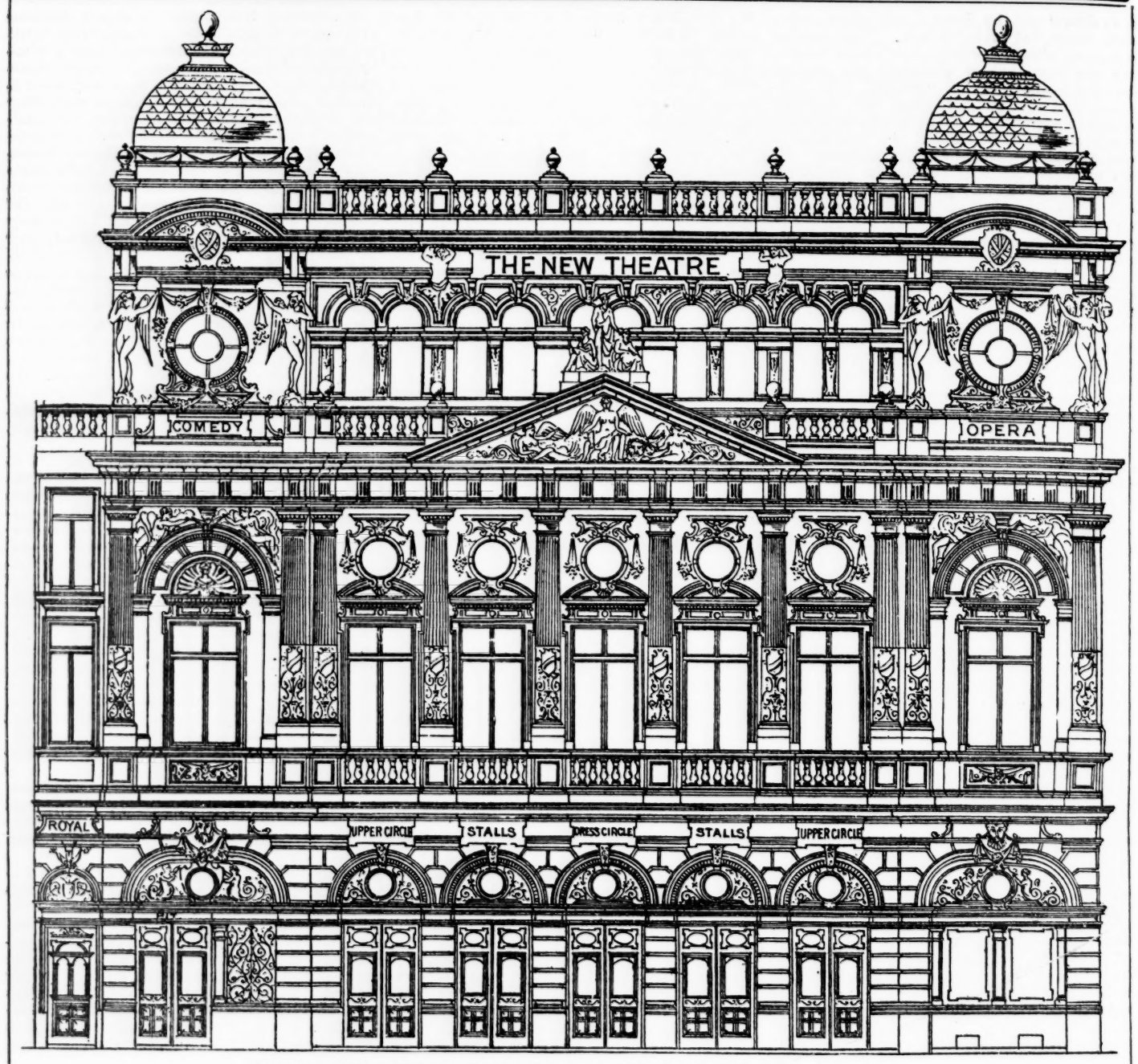
Mr. F. T. W. Goldsmith, in supporting the vote of thanks, said he wished to add his personal obligations to Mr. Bidlake for his paper. Mr. Bidlake had advised them to study men as well as materials. He thought that that was excellent advice, and that architects were not apt enough to study men, but were too much given to the mere studying of materials and tricks of the pen. The reason why engineers had got ahead of us in some measure was because they had laid themselves out to thoroughly understand what the public wanted, and had, as men of the world, given the public what they had a right to expect. Engineers had got behind the public, so to speak, and had, in a manner, learnt to know their weaknesses and had met their requirements in a more masterful and manly manner than architects had done. The reason for that might be that the architect has to attend to so many details of such smallness and variety, whereas the engineer had frequently to deal with larger and simpler works. An engineer, having calculated the strength of his materials and worked out the general scheme of the design, found that the great difficulty was to fight the matter out before various Parliamentary Committees. It was this which made it necessary for engineers to understand human nature, and this knowledge gave them that power in the world which architects did not usually possess. He was pleased to hear Mr. Bidlake recommend all architects to endeavour to understand mankind, and it was one of the advantages of the Association that in joining its ranks and discussing opinions expressed at his meetings, men got to know the public want. Both Mr. Bidlake and Mr. Cresswell had said that they did not think that any building had ever been built without "extras." He had known two cases where no "extras" were incurred. Mr. Bidlake had said that nothing was binding upon a corporate body but an agreement under the seal of that body. But supposing that a building committee were to authorise an architect to get out a complete set of drawings, &c., for certain buildings, and were to resign before the seal of the corporate body had been affixed to the agreement, would not that act be binding upon the whole Corporation? Did not the act of a building committee bind a Corporation just as much as the act of the Corporation would under the corporate seal? Mr. Mitchell had spoken as to the necessity of accurate drawings. None would challenge the importance of that. It was his practice, instead of making very elaborate drawings, which were frequently altered to meet unforeseen circumstances, to prepare his drawings very carefully in pencil, and to have them anilined. The anilined copies were then made the working drawings, and the pencil ones preserved.

Mr. Leonard Stokes said he found that one great cause of pitfalls was that architects could not get their clients to understand clearly what they wanted themselves, nor could they get them to understand a point when it was shown upon a drawing; and it very often happened that after one had taken much trouble to find out what a client's wishes were, when the work was completed the client was disappointed; and it was very disheartening to find that after doing one's very best to meet your clients' wishes you found out that you had not succeeded after all. Of course, it was entirely the clients' fault, if they could not understand drawings. The only way to guard against that was to be very careful to find out the clients' views, as far as they possibly could, and then make the drawings accordingly. They must use their judgment very often and persuade a client that he did not always really want what he thought he did. An architect should never be persuaded to do things that were absolutely improper in his opinion. He should not quarrel with his clients, but he would tell them that he disagreed with them and should continue to disagree; but if possible he could persuade a client to agree with him, that was the best thing to do. With regard to "extras," somebody had struck the right note when he said that full detailed drawings were of great importance. If they contented themselves with making a set of small scale drawings and a rough specification, they would probably find that their "extras" were numerous, because they could not always, in small scale drawings, make out what they wanted. He thought it would be much cheaper to the client, and more satisfactory in every way, to make as many details as they could beforehand, because if they made an eighth-scale drawing, the quantity surveyor took it and imagined mouldings and stop-chamfers in all directions, whereas, perhaps, they did not want mouldings and stop-chamfers at all.

Mr. A. Bolton having said a few words as to the importance of studying details of sanitary work,

Mr. C. H. Brodie said that Mr. Bidlake had brought rather an indictment against architects when he said that the public distrusted them. They were not bound to endorse that view, but still it was true that architects frequently spent more money than their clients wished them to spend. It behoved them to overcome that feeling of distrust, and they could only do that by being thoroughly conscientious. Mr. Goldsmith had spoken about the necessity of young men studying men as well as materials, and he (the speaker) did not think that that advice could be insisted upon too frequently or too strongly. In any work which would cost 200*l.* or 300*l.* there should be a provisional amount for contingencies. With regard to smoky chimneys, it had been said that the Board School chimneys were enclosed in 9-in. brickwork. He thought that chimneys ought to be covered with much thicker walls than that. They should, in fact, be covered with the whole house,—*i.e.*, placed in internal walls whenever possible.

The chairman (Mr. F. T. Baggallay, President), in putting the vote of thanks to the meeting, said it seemed to him that there were two kinds of pitfalls which they could fall into: those which they dug for themselves, and those which were already on the spot, and which they had to avoid. Those which they dug themselves were the easiest to be dealt with, if they took a little trouble in beginning their work, these would be few, and they could give so much more attention to avoiding the others. What Mr. Brodie had said about covering chimneys up with the whole house, that was, putting the chimneys in the inside, was no doubt good advice, as far as it went, for by that means warmth was not wasted and the chimneys were prevented from smoking; but in most plans where the chimneys were so arranged it was difficult to keep the fireplaces away from the doors. With regard to lady clients, he thought there were lady clients of all sorts, just as there were men clients of all sorts. Ladies had more to do with the management of a house, and they were therefore a little more careful with its details. With regard to the question of trusting to themselves, and not taking the opinions of others, he thought that they should beware of taking the opinions of others. There was no reason why, if they knew what they were about, they should not trust to their own opinions, rather than to the opinion of anyone else. He thought that the advice about studying men and managing people could be carried too far.




*Elevation of New Theatre, Cranbourne-street.—Mr. Spencer Chadwick, Architect.*

While it was necessary to treat some people with reserve, it was far better, when possible, to be perfectly straightforward with men.

The vote of thanks was then put to the meeting, and carried unanimously.

Mr. Bidlake, having said a few words in reply, the meeting terminated.

## Illustrations.

### NEW CHURCH OF ST. JOHN-THE-BAPTIST, NORWICH.

THIS church has for some years been in course of erection for his Grace the Duke of Norfolk, on the site of the old city jail. The site is a fine one, the floor of the new church being about upon a level with the starting of the spire of the Cathedral of Bishop De Lozinga in the valley below.

The nave, of ten bays, is now practically complete. It is vaulted throughout, and will before long be available for worship. A large presbytery or clergy-house is also about to be erected.

The view we publish (from a drawing by Mr. H. W. Brewer) illustrates the design proposed by the architect for the completion of the building, by the erection of transepts, central tower, and choir of four bays.

The first section of the nave—seven bays—was executed by Messrs. Rattee & Kett, of Cambridge, the remaining three bays, together with a large chapel to the south of the nave, have been carried out without a contractor, under the management of Mr. Thomas Burton, the clerk of works.

The stone principally employed is Beer stone, from Seaton, Devon. Ancaster and Clipsham have also been employed, as well as Aubigny stone, in the interior. The vault-cells are of clunch, and the roofs are leaded.

The architect is Mr. G. Gilbert Scott, M.A.

### DESIGN FOR A FRIEZE.

THIS design, by Mr. Arthur Gwatkin, was exhibited in the Architectural Room at the Royal Academy this year. It forms a bold and effective treatment of foliage conventionalised for ornamental treatment.

The frieze has been executed by Messrs. Hayward, of Newgate-street.

### HOUSES IN HANS-PLACE, S.W.

THESE three houses have been rebuilt on Hans-place. The fronts are mostly in gauged brick with Leicester brick facings. Carving has been introduced here and there in the good effect. This was done by the late Mr. MacCulloch, of Kennington. The builders were Messrs. Garlick & Horton, and the plans were prepared from designs by Mr. Duncan Carmichael.

The drawing from which the illustration is taken was exhibited in the Royal Academy this year.

### NEW THEATRE, CRANBOURNE-STREET.

WE give this week the section and plan of the dress-circle floor of this theatre in the lithographed plates, and a cut reproduced from a line elevation drawing lent to us by the architect, which is sufficient to indicate the architectural treatment of the front.

The elevation is to be executed in Ham Hill stone, quarry-worked on its natural bed; this stone has been selected as warmer in colour than Portland or Bath stone.

The main entrance will open into a Grand Hall, around which will run a balcony forming a foyer promenade.

The auditorium, which is to seat 1,500 persons, has been carefully arranged to secure a good view of the stage for all the occupants, and the tiers to the different circles will be carried on cantilevers without columns. The constructional ironwork has all been designed by the architect.

The whole of the decorations will be in the Italian Renaissance style, carried out from the special designs of the architect, and great attention has been paid, in designing the dome over the auditorium, to the acoustic properties of the theatre. Everything has been done to admit of the possibility of the theatre being emptied in the smallest possible time, the exits provided being in excess of those required by the London County Council. There are no less than twelve exits, two each from the stalls, dress circle, upper circle, pit, gallery and stage, and the whole building could, on emergency, be cleared within three minutes.

The stage will be among the largest in London, being 60 ft. by 40 ft., with a proscenium opening 31 ft. by 32 ft. It is to be divided from the auditorium by a fire-resisting curtain of double thickness of asbestos cloth enclosed in an iron frame and the scene-dock,

property and other rooms connected with the working of the stage, will be separated by fire-resisting doors.

The building will be constructed entirely of fire-resisting material, all ironwork being encased in concrete, and it will be fitted with a thorough system of hydrants. The orchestra will be constructed for the accommodation of a full band, with band and music rooms adjoining.

The ventilation and system of warming the theatre has been carefully considered. In addition to the main ventilating system through a large lantern light fitted with louvres and exhaust placed on the roof over stage, there are to be two smaller exhausts in the main building, and the retiring and dressing rooms for artistes on each level are also to be provided with outside ventilation and light. All drains will be disconnected and ventilated.

The contractor is Mr. Frank Kirk, and the architect Mr. Spencer Chadwick.

## THE SURVEYORS' INSTITUTION:

### PRESIDENTIAL ADDRESS.

Mr. Driver's able address, delivered at the opening meeting of the session of this Institution on Monday, was partially occupied with a consideration of the condition and recent depreciation of landed property in the agricultural districts, concerning which he gave some statistics which appear to have been the result of careful inquiry, and which probably embody correctly the latest attainable information on the subject. We have not space to give the address in full, and must confine ourselves to quoting the following remarks from the latter portion of it, in regard to the question of rating vacant building land &c.:—

'There are no social or political questions at present agitating the public mind which have more direct interest for surveyors than the proposal to assess ground rents or 'land values' and vacant building land to the payment of local rates. And this, not only because of the immediate effect on the value of real property which such an alteration in the rating laws would cause; but because, closely connected with these proposals is the idea that land and its increase in value should be the property of the community, and not of private individuals; and that therefore, while land remains in private hands, as much as possible of its value should be withdrawn from its owners, by transferring to them a larger share of the burdens of taxation. It would be unjust to ascribe such intentions to all advocates of the proposals in question, but it is the avowed end of many of them; and there can be no doubt that the changes proposed, and the arguments used in support of them tend decidedly in that direction.

A vigorous controversy on the subject has now been carried on for some years in the press and on the platform, as usual in such controversies, with a good deal of exaggeration and inaccuracy of statement; and the Parliamentary Committee which has for several sessions been taking evidence on the large range of subjects connected with the question has done, at any rate, one useful work, by collecting the views of the leading advocates of change and of the present system, with a great mass of information bearing on the whole question. It has tested and sifted the statements made by cross-examination, and published the whole in several huge Blue Books, so that anyone who really desires a solid foundation of fact and argument on which to base an opinion will find the materials there. I fear, however, it is hardly to be hoped that many persons will voluntarily undergo the labour necessary for this.

Whatever conclusion may be arrived at by the Committee, they have at any rate had the advantage during the last session of hearing what was to be said in favour of the proposals for change from a most competent advocate, who began the evidence of the session by stating at considerable length his views in favour of taxing land values and vacant building land; occupying, indeed, three days in giving his evidence, and about fifty pages in the Blue Book in reporting it. He is too well known here for it to be necessary for me to remind you that he is not only a very able advocate, but a distinguished man of science, who has given very special study to this subject, and written a well-known pamphlet upon it. It may, therefore, be fairly considered that his evidence represents the best or worst that can be said against the present system; and on that account it is worth while to inquire why he condemns what exists, and what he, and those whom he so ably represents, propose to substitute for it.

As this gentleman's views are now public property, and as he certainly has the courage of his convictions, he will, I am sure, not object, though a member of this Institution, if I endeavour this evening to deal with some of the points in his evidence. He stated that the enormous increase in the rateable value of real property was due to the concentration of life in towns and to 'communal expenditure,' and that, therefore, all rates should come out of property; which, in towns, he divided into two classes,—(1) land, which (he says) derives its value only from the presence of the community, and not from the expenditure of capital upon it; and (2) buildings, which derive their value from the outlay of private capital, and produce an annual return, which, being subject to allowance for risk and depreciation, is not of equal value to the annual return produced by land, and should therefore be taxed at a lower rate. He argued that, as the value of town property depends on the maintenance of the town as a community, and the rise in value of such property on the maintenance of the town as a prosperous community, the whole 'communal' expenditure is essential for the maintenance and creation of the value of land and houses, and therefore that a large part of that expenditure should be borne by property within the town.

As, however, he is of opinion that the whole permanent element of communal expenditure goes to increase the value of land as distinct from the buildings upon it, he thinks sites should contribute to such expenditure at a much heavier rate than buildings, and this even to such expenditure as poor-rate, which has no direct connexion with land value.

He proposes to secure this by assessing sites and buildings separately, and levying a heavier rate on the land than on the buildings,—*e.g.*, 6s. in the pound on the site, and 4s. in the pound on the buildings. The whole of these rates he would collect from the occupier and allow him to deduct them from his rent; and so on in proportion from each payment of rent down to and including the ground rent, if any. In this way, the total rates levied would not be increased, but part would be shifted from the building owner and laid upon the owner of the site.

He added that he considers there is a third or 'personal' element in properly constituted local taxation; but that buildings should not be assessed for the payment of this personal taxation in proportion to the actual rent, but only to their residential values: in other words, that shops should only be assessed at their value as dwellings; and, also, that houses let at small rents should be assessed very lightly as compared with houses of high rental value.

It is not clear in his evidence at what amount he proposes to fix this rate, but, as he contends that the provision of water and gas, and road repairs, are expenses which should largely be borne by owners 'because the community would fail to exist without them,' the probability is that the proportion of communal expenditure he would leave to fall upon occupiers would prove to be too small to be worth consideration. It might be remarked, however, that the same arguments would justify the cost of the provision of bread for householders being largely thrown on their landlords; and that the exemption of houses of small value, and shops, at the expense of highly rented residences, might work great injustice in the cases of those whose large families compel them to occupy large houses, the rents of which are in reality out of proportion to the incomes of the tenants.

As regards the rating of buildings, he would allow some readjustment of the terms of existing contracts, to compensate building owners for the whole of the rates on the buildings being deducted from rents which had been fixed on the understanding that all rates would be paid by the tenants; but as regards the rates on land values it appears to be his intention that these should be borne by the site owners as a new burden, without any alleviation.

Lastly, he would assess all vacant building land to the payment of rates at its annual building value, because 'we are suffering from a lack of good houses in towns at reasonable distances from the centres of activity' and putting an annual charge of rates on vacant land would, he thinks, force it into the market, and so lead to a better supply of houses; and he is of opinion that, in towns, land is only lying idle because the owner holds out for a better price, and thinks that building land in towns rarely remains vacant if the owner will take what he calls the 'ordinary price' for it. The ground which is covered by the evidence is too wide for me to do more than mention the principal points on which it has, in my judgment, been completely answered by the evidence of other witnesses.

In the first place, it is not accurate to ascribe the increase in the value of town land and buildings in any large degree to 'communal expenditure.'

The values of such property rise because of the presence and prosperity of the surrounding community; and that rise takes place as really in the roughest mining towns which spring up in a few days in South Africa or America without any communal expenditure at all, as in the City of London. The members of a community once established make provision for their own comforts and safety by providing roads, sewers, lighting, police, and so forth, by united action, just as it provides by individual action for its food and drink; but it is the value already created which makes this expenditure necessary, not the expenditure which creates the value. There is, of course, some public expenditure, such for instance as that on street improvements, which, no doubt, does improve the value of some property; but it is a matter of common knowledge to us all that, wherever some property is improved in value by such causes, there is sure to be other property depreciated by the very same works; and it would be gross injustice to make all property alike bear specially increased taxation because of an expenditure which only benefited some.

Moreover, it was very clearly proved that, as a matter of fact, and not of theory, rates, at any rate as regards London property, do already 'come out of property.'

It was clearly shown that, owing to many causes, the supply of buildings for trade and dwellings in and near London had kept so far ahead of the demand that there was no monopoly on the part of building owners which would enable them to dictate terms to the occupiers and throw upon them the burden of the rates; but, on the contrary, that the rents occupiers would pay were always fixed by them with regard to the amount of rates they would have to pay in addition; and examples extending over several years were given, showing that in cases of offices and cottages on which rates were paid direct by the landlords the rents had actually fallen, while the rates paid by the landlords had increased, and *vice versâ*. Even, therefore, if the witness's view as to the liabilities of property were correct, it would seem to be shown that it already bears them.

But, if the necessity for increasing the burden on property really existed, grave exception is taken to the mode in which the witness proposes to do so. In the first place, the separate assessment of sites would involve the payment of rates on ground-rents by owners who have, in many cases, given high prices for these rents as investments, on the faith of the contract with the lessees that the ground rents should be paid free of deductions for rates.

To alter the terms of the contract by enforcing the deduction of a share of the rates from those ground rents would obviously not only deprive ground rent owners of a part of the income for which they had paid a specially high price, but would seriously diminish the capital value of their investment by introducing the element of uncertainty into it.

Nor is there any unfairness in the existing contract to justify such a confiscation; for it has been conclusively shown that, in the first place, the whole amount of the rates existing at the time of the granting of the lease, in reality fall upon the ground landlord; that is to say, that if no rates had been payable on the building the lessee could and would have given in ground-rent just so much more as he was spared in rates; and, in the second place, that as the rental value of London property has increased since 1851, when the great rise in rates commenced, much more shall the rates have increased, the building-owners' liability for all increase of rates during their terms has been much more than covered by the rise in value of their leasehold interests during their term, which their leases have enabled them to appropriate entirely to themselves.

In the second place, it was shown that the separate assessment of sites at their annual value, irrespective of the ground-rents paid, would be, in many instances, assessing a reversion from which, at the present time, no one was reaping any benefit, and from which the person, who would be burdened with the tax upon it, might *never* receive any benefit; as in instances, which were given, of buildings of which the sites were worth by themselves ground-rents higher than the best rent actually obtainable for the buildings and sites together; while circumstances, out of the control of the owners, rendered it impossible to pull the buildings down and turn the sites to better advantage at present.

The fair basis for assessment for taxation is admitted by the witness to be the benefit property actually produces at the present time; and, if so, the only mode of assessment which can possibly be made on a fair basis is the assessment of buildings and their sites, taken together at their value as a whole.

Building land has no value as building land at all apart from the value of a building that is, or may be, upon it; and the fact that the building decays, while the site does not, is no reason for dividing into two parts, for the purposes of present assessment, what only has a productive value while united. Apart, however, from objections of principle, there are obvious grave practical objections to a system which would involve varying reductions for rates being made by tenants from every payment of rent, with all the trouble and friction which settling such deductions every quarter would introduce into the management of house property.

Very conclusive evidence was given as to the injustice and undesirability of rating vacant building land. It was shown that there was no necessity whatever for forcing building land into the market in or near London; on the contrary, that the supply of sites and houses had for years been in excess of the demand, and that many districts had suffered much depreciation in consequence. Moreover, it was proved that uncovered building land does not usually remain uncovered because of an extraordinary price being asked for it; but because the demand for tenants of premises does not justify builders in building upon it. However cheap the land, respectable builders will not sink their money in covering it, unless they see a prospect of getting tenants or purchasers for their buildings when completed; and, where business is bad, building land would lie idle at any price.

It was also shown that the public gain greatly in the cheapness of sites and facilities for building, created by the present system of laying out building land in advance of the demand for it; and that it would be impossible to do so and keep open any market for building plots if the ownership of them involved an annual expense in rates while the land lay unproductive. It would seem, therefore, that to carry out the witness's proposals in this instance would inflict great and undeserved hardship on the owners of building land, and injure the public generally by seriously hampering the operation of the market, which, whatever its faults, has, at any rate, been more than successful in supplying the demand.

The points in this gentleman's evidence and in that of his opponents which deserve and would reward attention are very numerous; but it is impossible now to do more than to recommend those interested in the subject to study the evidence itself, reported in the Blue Book issued a few weeks ago by the Town Holdings Committee."

## *COMPETITIONS.*

BOARD SCHOOLS, BROWNHILLS.—The Norton-under-Cannock United District School Board have adopted the designs submitted by Mr. Geo. H. Cox, of Birmingham, for the proposed new schools at Brownhills.

A CAUTION.—We recommend assistants and pupils in architects' offices in London to be cautious of giving credence to a person who may come into the office in the principal's absence, and tell them that he has been instructed by the principal to call for a certain drawing to be published in the journal which he represents. It is better in such cases to require a written instruction, or to refer to the principal first. They may then find, before it is too late, that the statement is a direct falsehood, told in order to get possession of a drawing which has been promised to another journal.

## MAGAZINES AND REVIEWS.

THE *Gazette des Beaux-Arts* is of course *facile princeps* among magazines dealing with art, and seems, in fact, better than ever. The November number is a remarkably interesting one. It commences with an article on the late Elie Delaunay, by M. G. Lafenestre, giving a biographical sketch and some criticism of his work, accompanied by a fine engraving among other works of his "Diane" (now in the Luxembourg), a nude figure distinguished by a head of remarkable force and individuality, expressing the character of the goddess, not a mere classic prettiness. M. Gustave Gruyer continues a series of articles on "Sculpture at Ferrara," the present one dealing mainly with Alfonso and Girolamo Lombardi, also touching on the work of Giorgio Albenga, whose powerful alto-relief medallion of Clement VIII. forms one of the illustrations. M. Louis Gonse writes a short *critique* of the new museum Palace at Vienna, and M. de Champeaux enters on the sixth and last of a most interesting series of articles on "Art décoratif dans le vieux Paris," a series of papers with a number of curious and interesting illustrations.

The *Art Journal* contains an article by Mr. Raffles Davison entitled "A Modern Country Home," with interior sketches showing what has been done in the way of giving artistic and architectural interest to the adaptation and alteration of an old house. The sketches are charming, and the house seems to be very well done (Messrs. Ball & Elce are named as the architects). An article on the National Art Competition (Department of Science and Art) is illustrated by reproductions of some of the students' designs. The "Annual" number of the *Art Journal*, on Mr. Britton Riviere, contains a whole series of admirably executed illustrations from his works.

To the *Magazine of Art* Mr. W. F. Dickes contributes an article endeavouring to solve the mystery of Holbein's "Ambassadors" picture, as to the identity of the persons represented. The author goes very fully into the significance of every detail in the picture, and the article is certainly calculated to add to the reader's interest in studying Holbein's remarkable work. An article by Mr. Woolner, "Where to Draw the Line,—a Word to Students," is a clever and suggestive paper, in which, however, he advises the student to leave the art magazines alone and draw something, he will find it more useful: to which the editor naturally comments, "How then would Mr. Woolner's paper be read?" An article on "The Collection of Mr. Alexander Henderson" includes illustrations to a pretty large scale of the separate figures in Mr. Burne-Jones's "Days of Creation," which is part of the collection.

The *Antiquary* includes "Researches in Crete" by Dr. Halbher; the sixth of "Notes on Archæology in Provincial Museums," on the Carlisle Museum, by Mr. R. S. Ferguson; Boxley Abbey, by the Rev. Cave Browne-Cave, and No. II. of articles on ancient wall-paintings, by Mr. G. Bailey, dealing with those in the chapter-house at Lichfield. In its "Notes of the Month" the *Antiquary* draws attention to the damage done in the ruins of Byland Abbey by people cutting their names, &c., on walls and tombstones; it seems there is no custodian and no one to preserve the ruins from ill-treatment: surely this should be altered.

In the *English Illustrated Magazine*, Mrs. Marwood Tucker writes an article on "Hatfield House," the illustrations to which, those of the exterior of the house at all events, are not as good as they might be; the interior ones are better. There is an article headed "Art Notes from Australia" by Mr. Gilbert Parker, which assures us that "Art is alive in Australia." We fear some very bad art is. The writer indeed tells us that "New South Wales has one of the best water-colour collections in the world," but of what? of "most of the water-colour painters of the more modern British school." There appear to be a good many good collections, however, in Australia, and that is a step. The next step probably will be painting of Australian scenery by Australians. The writer of the article says—

"The pictures exhibited now are of the life around; they are honest in that at least. A distinguished literary man said not so long ago that there was nothing to paint in Australia. There is nothing anywhere that may not be painted if the eye that looks upon the world, and all that therein is, really sees, and if the mind to which it reflects its impressions has the power of selection. A bullock-team on the Darling Downs is as worthy a thing to paint as an English wheatfield; Govett's Leap lends itself to stately power as much as the Highlands of Scotland; and there are tints in the skies of the South, and colours on the shores of Australian seas as full of beauty as any that ever rose before the eyes of a master. There is something more than a long monotony in Australian scenery. The man who really lives the life knows that. The true Australian knows it, and he is beginning to see what the office of the artist is."

It will be certainly of interest to see the rise of an indigenous school of Australian landscape painting.

The *Portfolio* commences with an article by Mr. Hamerton on "the present state of the Fine Arts in France," one of a series, this number dealing with French architecture. Mr. Hamerton considers that "the interest of France as a country for the study of architecture is that the art is alive there and national, not seeking its models in any foreign contemporary school, and treating those of the past with the freedom that belongs to complete independence." He is not unmindful, he says, of the good and original work produced by several English architects at the present day, but thinks that France produces architecture "more easily and naturally as well as in greater abundance. For example, a block of buildings like Queen Anne's Mansions would not have been erected in France." Probably it would not, but the difference is in the standard of taste among the people at large, more than in the architects. Mr. Hamerton is not fortunate in all the examples he produces of contemporary French architecture, if he means to select the most favourable specimens.

In the *Nineteenth Century* Sir J. C. Robinson writes an article on what, as he says, is the "very large subject" of "Spurious Works of Art." He mentions in the course of it a practical test for paintings—try to stick a pin into the most thickly-painted portion. If the pin sticks in and remains, it is new paint; if the surface is hard enough to resist the point, it is not.

Of the American magazines, *Scribner* is less artistic than usual, but includes an illustrated article by Mr. G. Hitchcock on "The Picturesque Quality of Holland." The "Point of View" notes at the end include one on the "Safety of Buildings," in regard to a recent fall of a building in New York. *Scribner* blames the Building Department of New York for inefficient inspection. The *Century* has an article on "A Great German Artist," Menzel to wit, who we do not think is quite as great as Mr. Carl Marr makes him out to be. The number is prefaced by two good engravings of Michelangelo's "Cumæan" and "Delphic" Sibyls. In *Harper* the article on "Cairo in 1890" is continued, and Mr. Walter Besant treats of "The London of Good Queen Bess," in which is given an illustration of Gresham College in 1879.

The *Strand Magazine* has a well-illustrated article on Mr. Tinworth and his work.

Generally speaking, there is less of artistic literature than usual in this month's magazines.

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*Cassell's Magazine* contains an article on "Railway Signalling" (by Dr. Alexander Yapp), which gives some interesting details about the working of our railway traffic. Another article of some interest is "New Lands for Londoners," a description of the part of Buckinghamshire opened out to Londoners by the extension of St. John's Wood Railway. The article has appended to it the well-known initials "W. J. L.," and is illustrated by sketches by Mr. Charles Wilkinson.——The *Leisure Hour* contains an article on "The Land of the Corsairs," by Stanley J. Weyman. It is illustrated by Whymper, one of the illustrations being that of an elaborately-ornamented Roman arch at Tripoli. Another article of interest is one by W. J. Gordon on the horsing of our London omnibuses and tramways,—an interesting chapter about the "horse world of London." The illustrations are by C. A. Corbould.——The *Sunday at Home* contains an article by the Rev. Charles Merk on "The Religions of India as illustrated by their Temples." An illustration is given of the Buddhist Tope at Sarnath, Benares.——The *Girls' Own Paper* contains an article on "The Influence of Art," by Lady Mary Wood.

THE JUNIOR ENGINEERING SOCIETY.—Sir E. J. Reed, M.P., has accepted the Presidency of the Junior Engineering Society, the eleventh session of which is to be inaugurated on the 27th inst. by the delivery of his Presidential address.

## *ARCHITECTURAL SOCIETIES.*

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—The usual monthly meeting of this Society was held at the School of Art on Tuesday evening last, Mr. Innocent, the President, being in the chair. The following gentlemen were nominated for the Studentship of the Society:—Messrs. C. F. Innocent, Frank Wilson, Oscar Bromley, Brook Greaves, W. A. Hall, and W. Woofinden. An important paper was read by Mr. E. M. Gibbs, Vice-President, on "Architectural Education in Sheffield." Mr. Gibbs remarked that the subject of his lecture was suggested by a letter from Mr. Arthur Cates, the Chairman of the Board of Examiners of the Royal Institute of British Architects, addressed to the honorary secretary, and recommending "the utilisation by the Society of the resources of the different local educational agencies for the advantage of architectural students." Having pointed out how much the Royal Institute had done for the profession by the establishment of progressive examinations and encouraging candidates to pursue a systematic course of study, he said that, however much opinions might differ respecting the details of architectural education, the issue of the R.I.B.A. programme practically settled the line to be adopted for the time by the provincial societies. He argued that the present system of pupilage, though well adapted to the learning of the practical duties of an architect's office, required further aids in pursuing the higher artistic and scientific studies called for by the programme, and he thought the want would be supplied by the establishment of a local class or studio on the lines of the new efforts of the London Architectural Association. One great object of such a studio would be the formation of a good architectural library. A vote of thanks was awarded to Mr. Gibbs for his paper, and, on the motion of Mr. Smith, seconded by Mr. Hadfield, it was resolved to empower the Council to deal with the subject at an early date.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this Association was held on the 3rd inst., the President, Mr. William J. Anderson, in the chair. A paper on Ruskin's "Stones of Venice" was read by Mr. L. Douglas Penman. The scope of the review was limited to the sections bearing particularly on the Venetian buildings, passing the portions devoted to disquisition on architecture in general. By means of a series of photographs the features of the buildings of Venice were illustrated. Mr. John Stewart opened the discussion which followed, after which the customary vote of thanks was passed to the essayist.

DUNDEE INSTITUTE OF ARCHITECTURE.—The eighth session of the Dundee Institute of Architecture, Science, and Art was opened on the 4th inst. by Professor G. Baldwin Brown, M.A., Edinburgh, who delivered a lecture on "Some Notes on the Growth of Cities." Mr. Charles Ower, C.E. (the President), occupied the chair.

## SANITARY INSPECTORS' ASSOCIATION.

THE first meeting of the Sanitary Inspectors' Association for Session 1891-2 took place at Carpenters' Hall, London-wall, on the 7th inst., Mr. Hugh Alexander, Chairman of Council (elected for the fifth year in succession), presiding over the proceedings. After the usual formal business,

Mr. Alexander read the inaugural address for the Session. He made reference at the outset to the important change which had recently taken place in the status of the society, which, since the last session, had become an Incorporated Association under the licence of the Board of Trade. Under the articles the Association had accepted powers and responsibilities whereby it can establish lectures and class-rooms, hold examinations, award prizes, grant certificates, hold estates, raise money, and receive gifts of money or property. Besides "the promotion of the objects of sanitary science and kindred objects," it had been specially provided that no members of the Association shall receive any pecuniary benefit, directly or indirectly, from the funds of the Association. It could not be said that they had been too precipitate, for the movement in favour of "incorporation" had been deferred until the experience of eight years had demonstrated that the membership covered the whole country, and that a loyal spirit of unity existed in the organisation. The address said there was a danger of forgetting "that the system of building on leasehold lands was a great cause of the many evils connected with overcrowding, insanitary buildings, and excessive rents . . . . is conducive to bad building, to deterioration of property towards the close of the lease . . . . and that legislation favourable to the acquisition, on equitable terms, of the freehold interest on the part of the leaseholder, would conduce greatly to the improvement of the dwellings of the people of this country." This was the testimony of the Royal Commission on the Housing of the Working Classes, and it was held to have proved the necessity for the legislative prohibition of the leasehold system, in so far as it related to new buildings and house property. The necessity of a code of laws relating to town lands, leaseholding, and the construction of dwelling-houses had been demonstrated by the report of Dr. Barry and Mr. P. Gordon Smith, who had pointed out, first, that in certain towns land could not be procured even for artisans' dwellings, except at rates of from 1,089*l.* to 2,420*l.* per acre, and, secondly, that vast numbers of back-to-back houses continued to be built year by year. The President suggested that it would become the Association of Sanitary Inspectors to protest against the wholesale violation of sanitary law as perpetrated in the construction of back-to-back houses, and to urge upon the Legislature that existing back-to-back houses should be remodelled in conformity with modern requirements, or demolished as being unfit for human habitation. The progress realised in the Victorian era was traced. Drainage was at the commencement in its infancy; cesspools, now proscribed, were then prescribed; the wells, then largely used as the sources of supply for drinking-water, were polluted by the infiltration of excrement with which the earth around was often sodden, while water was only supplied on three days per week, and then only for twenty or thirty minutes at a time. At certain epochs in that era reformers like the late Sir E. Chadwick had awakened the public to the danger to health of sanitary neglect, and, for the time, sanitary reform became the theme of the pulpit, the platform, and the press; but when the alarm subsided the world went on as before. In later years the public had learned to appreciate better the works of the sanitary inspector, but it was unfortunate that these officers of health remained altogether inadequately armed for the discharge of their important duties. It was greatly to be regretted that the Legislature had again, in the Public Health (London) Act, which would come into force in January next, failed to give proper effect to the laws affecting public health, by fastening responsibility upon the sanitary inspector for the inspection and detection of nuisances, and the institution of proceedings for the abatement of nuisances. This Act fell short in many of its clauses of the requirements of the present day, but it would be of great advantage to executive officers who would in future have to deal with one Act instead of many, and these often of a contradictory character. The hopes of the future, as had been pointed out by a high authority, must rest in the efforts made to educate the younger members of the community. "The most pressing work of sanitary reformers is now," concluded the paper, "not so much to legislate as to educate, and to that end have we undertaken the powers, duties, and responsibilities of an incorporated association, whose principles of action will be controlled and directed with reference to the public welfare, in which good work we invite the hearty co-operation and assistance of all who are interested in the progress of sanitary reform."

A discussion followed on the usual proposal of thanks to the President, in which Mr. Lyon (Hon. Mem., and for many years a representative for Peckham on the Camberwell Vestry), Mr. West, Mr. Tidman, Mr. Fairchild, and other members took part. A resolution in favour of urging upon the Education Department the necessity of including the subject of "Hygiene" in the programme of subjects taught in elementary schools was passed, on the proposition of Mr. Lyon, who said he was able to testify to the truth of the dark pictures drawn by the President of the condition of things in the early part of the Victorian era, both in London and Glasgow. In 1846, he had succeeded in laying in a fresh stock of health from a holiday in the Highlands, but all, and more than all, the good was undone on his visiting Glasgow, in three days, where he was struck down by a dangerous attack of illness, caused undoubtedly by the general sanitary neglect then prevalent. In 1886, nearly all the abominations of forty years before had disappeared from Glasgow. In the other case, during one of the visitations of cholera, all the evil conditions described in the paper, including the three days a week intermittent supply of water, existed in Stockwell-street, Camberwell, where the cholera first got a serious hold in the district. By obtaining a daily water-supply (Sunday included), and by the prompt application of the proper sanitary measures, they had succeeded in limiting the outbreak to that street, where it proved terribly fatal, and in stamping out the infection from the locality. In one of the most interesting papers read at the recent Congress of Hygiene, Dr. Newsholme had demonstrated that, if any great sanitary progress was to be looked for in the future, they must "begin with the young," and it was on that account that he so strongly urged the subject upon the attention of the Education Department.

A resolution was also adopted asking the Council to consider what course of action was open to the Association to contend against the continuance of the practice of building "back-to-back houses."

## THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday afternoon at Spring-gardens, the Chairman, Sir John Lubbock, presiding.

*Tenders.*—Tenders were received for the construction of "either one or two sludge vessels" and for the erection of a lodge, &c., at the North Woolwich Gardens. These lists of tenders will be found among other lists in this week's *Builder*.

*The Proposed Municipal Lodging House.*—The Housing of the Working Classes Committee brought up the following postponed report as to the proposed Municipal Lodging-house in Drury-lane:—

"Your Committee have to report upon the tenders for the erection of the Parker-street lodging-house, which were opened by the Chairman of the Council on the 20th instant, and referred the same day to your Committee. The amounts of the tenders range from 13,988*l.* to 18,500*l.*, and the five lowest are:—

| | |
|---|---|
| Mr. F. T. Chinchen ..... | £13,988 |
| Messrs. J. Godfrey & Son..... | 14,297 |
| Messrs. Holloway Bros..... | 14,300 |
| Messrs. Perry & Co. ..... | 14,746 |
| Mr. C. Wall ..... | 14,850 |

Although the architects of the building, Messrs. Gibson & Russell, had previously warned the Council by letter that in consequence of the rise in the rate of wages and in the price of materials, their original estimate of the cost of the building would in all probability be exceeded, your Committee were not prepared for so great a difference as that disclosed by the tenders.

When your Committee first reported to the Council in March, 1890, recommending the erection on the Parker-street site of a model lodging-house to accommodate 320 persons, the cost of the building, including furnishing, was estimated at 11,000*l.*, and the net return to yield 4 per cent. upon the outlay and value of site was based upon a charge of 4d. a bed per night.

This estimate was made upon a design prepared by the Architect of the Council. Subsequently it was decided to invite designs by public competition, with the result that in the month of May last the design of Messrs. Gibson & Russell was selected and adopted.

This design had to be remodelled owing partly to the decision arrived at to open out the Shelton-street area by the acquisition of Messrs. Corben's and Messrs. Hunter & Hyland's premises (which allowed of an increased frontage for the lodging-house), and partly to the necessity of complying with the building regulations of the Council and keeping down the height of the building itself so as not to exceed the width of the street. These circumstances involve the construction of a building of three blocks instead of two, and of an additional staircase, meaning an extra expense of about 1,000*l.* The lowest estimate, as will be observed, is 13,988*l.*, which is 4,000*l.* more than the original estimate, or 3,000*l.* more if the above circumstances are taken into account. Messrs. Gibson & Russell, the appointed architects, attribute this difference in part to the advance in the cost of building materials and machinery and the rise in wages (which they put together as representing 10 per cent. of the total cost), and in part to items added to the specification at the request of your Committee, such as a separate building for laundry purposes, iron and cement divisions to cubicles instead of wood, stone

facing to building, and granolithic pavement in lieu of cement. Your Committee have considered whether, having regard to the amount of the tenders, it would be well to omit these items, or some of them, and so reduce the initial outlay, but they are strongly of opinion that as this is the first building of the kind, and one intended to serve as a model, it would be most undesirable to run any risk of not producing a wholly satisfactory result. At the same time they consider it necessary that the sum to be charged per bed should be one which should yield a return of 4 per cent. on the total oulay, and that, in view of the exceptional advantages proposed to be offered of separate cubicles in place of the customary dormitory plan, a somewhat higher charge should be made per bed than 4d. a night.

Referring to the tenders themselves, the usual inquiries having been made, it appears that Mr. Chinchen, whose tender is the lowest, is not prepared to carry out the work. The next tender is that of Messrs. Godfrey, which is only 3*l.* lower than that of Messrs. Holloway. After careful enquiry, your Committee are of opinion that as Messrs. Holloway are known to be builders of experience, it is desirable that their tender should be accepted.

If the Council accept this view the corrected estimate of the cost of the building will be as follows :—

| | |
|---|---|
| Contract price | £14,300 |
| Cost of furnishing | 750 |
| Architects' commission, Clerk of Works, and Quantity Surveyor (not considered in original estimate) | 1,100 |
| | £16,150 |

If a charge of 5d. per bed per night is made, after due allowance for wages of persons to be employed, for empties and for repairs, a return may be expected of over 4 per cent. on the above sum, and on the value of the site which for that purpose we calculate in the form of ground rent at 3d. a foot, which is probably more than the land would fetch in the market if sold for artizans' dwellings.

The definite recommendation your Committee now make is—

'That, subject to the usual estimate being submitted by the Finance Committee in accordance with the statute, the Council do accept the tender of Messrs. Holloway Brothers, for the erection of the Parker-street lodging-house.'"

Mr. Acworth moved, as an amendment, "That the recommendation be referred back for further information." This was seconded by Alderman Debenham, and lost, as was the fate of another amendment by Mr. Hutton, and the recommendation of the Committee was adopted by a large majority.

*Proposed widening of Parliament-street.*—The Improvements Committee's report contained the following :—

"In 1887, an Act, promoted by a body of gentlemen resident in Westminster, was passed, sanctioning an improvement scheme which embraced the widening of Parliament-street, and other adjacent thoroughfares. The object of the promoters appeared to be twofold—(1) to effect an improvement of the locality, and (2) as a commercial enterprise, to make a profit for those investing their capital in the undertaking. In the interest of the public the Act imposed certain onerous obligations upon the promoters, which, as we are informed, occasioned difficulties and delay, necessitating another application to Parliament in 1890 for an extension of time. This extension lapsed in August of this year.

We have had under consideration a memorial from the 'undertakers' or promoters and other gentlemen resident in Westminster, and have received an influential deputation. The promoters urge that the improvement of the approach to the Houses of Parliament, by means of the widening of Parliament-street, would be one of an important Metropolitan character ; that the remaining portion of the scheme, affecting the adjacent streets, would have the effect of throwing into the public thoroughfares 20,000 ft. of land, after allowing for the streets and courts proposed to be closed ; and they further urge that the result of the improvement would be to largely increase the rateable value of property by the erection of large and stylish buildings in place of those now existing. The memorialists request a contribution from the Council of 200,000*l.*

We have no hesitation in expressing an opinion that the widening of the Parliament-street approach to the Houses of Parliament would be desirable, but we consider that it is an improvement which might appropriately be undertaken by Government. The setting back of the western side of the street in a line with Whitehall would make a handsome thoroughfare, and would give an admirable view of Westminster Abbey, while the other portions of the scheme would decidedly embellish this part of London ; although we should be disposed to criticise certain details in the event of the proposition being practically carried out.

In regard to the Council contributing to the cost, the only portion of the scheme which would justify any expenditure out of the County Fund would be the widening of the main thoroughfare—Parliament-street—and for the reason already indicated, we cannot recommend the Council to sanction any outlay for this purpose. We therefore recommend—

'That the memorialists be informed that while the Council is of opinion that the suggested improvements would embellish the part of London in which they would be situated, it is not prepared to make any contribution towards the cost.'"

The recommendation was agreed to, and the Council, after transacting a great deal of other business, adjourned.

## THE KENNEDY BRICK-MACHINE.

THE Kennedy Dry-Press Brick-machine,—a title of considerable comprehensiveness of signification,—has claimed for it that it possesses advantages "over all other modes of manufacturing bricks." A few days since the Kennedy machine had a great field-day at the works of the Hewitt Brick and Tile Company at Southall, at which a large number of pressmen, brickmakers, and visitors assisted. It is only just to say that it did turn out excellent sharp-edged solid bricks ; and it must also be justly admitted that, although it was fed with all kinds of food, it did its best with every sort of clay that was offered to it. Coal measure shales, slate waste, drift clays of every variety, clays with chalk gravel, London clay, Cambridge clay, fire-clay, all were turned out in admirable fashion. The machine looks heavy and cumbersome, and the parts somewhat complicated. Of course, the great strain is at the instant of nip of the brick earth within the mould as it is simultaneously pressed from above and from below. The whole stress of this operation is borne by two gigantic wrought-iron bars, one on each side, which are fixed to, but entirely independent of, the framework of the machine. On the other hand, it is at this crisis in the formation of the bricks that the strain also will fall upon the gearing and the levers. The machine makes four bricks at a time, discharging the same on a table bracketted to the frame, at the rate of forty-four per minute. This gives a daily capacity of 26,000 bricks. The moulds are of hardened steel, highly polished, to give the bricks a superior finish so essential for first-class fronts. The machine is entirely automatic. The clay is ground into a powder, and is elevated mechanically into a hopper above. The powder is discharged into a measuring cylinder which retreats before the lever pressure comes on, but advances after the pressure, refilling the moulds as it pushes the formed bricks on to the receiving-table from the lower lever plates which have brought them up to its level. As the moisture in the powdered clay is very small, and only sufficient for adhesion of the particles, the bricks can be made all the year round ; and independent, too, of the weather, as the machine is worked under cover. The moulds also are heated, obviating the necessity of cleaning, as they are left at the end of a day's work as clean as they were at the beginning.

The machines are said to be in extensive use in America, and are well worthy of the attention of English brickmakers.

## BUILDERS' BENEVOLENT INSTITUTION :

### ANNUAL DINNER.

THE forty-fourth anniversary dinner in aid of the funds of this Institution was held on Thursday, the 5th inst., at Carpenters' Hall, London Wall. Mr. B. E. Nightingale, the President of the Institution, occupied the chair, and was supported by Mr. George Plucknett, J.P. (Treasurer of the Institution), Mr. J. W. Hobbs, Mr. Basil Peto, Mr. B. J. Jacob (Warden of the Carpenters' Company), Mr. Howard Clarke, Mr. H. T. Northcroft, Mr. W. Higgs, Mr. C. Bussell, Mr. T. Stirling, and other friends of the Institution, the company numbering over 150.

The Chairman gave the toasts of "Her Majesty the Queen" and "The Prince and Princess of Wales, and the rest of the Royal Family." The Chairman also gave "The Army, Navy, and Auxiliary Forces," Major Brutton responding for the Army and Navy, and Lieut. Clarke for the Auxiliary Forces.

The Chairman, in proposing the toast of the evening, "Success to the Builders' Benevolent Institution," said that this charity, which had been founded for the purpose of helping those who had been less fortunate than the gentlemen he saw around him, had been in existence some forty-four years. During that time more than 250 persons had been assisted ; at present there were fifty-four pensioners, and several candidates were waiting the opportunity of receiving their benevolence. The work of assisting their less fortunate brethren was one which should commend itself to the liberality and generous sympathy of all those connected with the trade. They must all have known many men who had "gone under" through no fault of their own, but by stress of circumstances over which they had no control. It was sufficient to know that men holding at one time good positions had left their widows and families unprovided for, and that those who subscribed to this charity were doing their best to help such unfortunate persons. The Institution depended entirely on the liberality of the members of the building and allied trades, and was, therefore, unlike many charities which could appeal to all classes of the community. The Chairman concluded his appeal to the sympathy of his hearers by coupling the toast with the name of Mr. George Plucknett, J.P., the Treasurer.

The toast having been duly honoured,

Mr. Plucknett replied on behalf of the Institution, and said he feared that this year the lamentable strike of carpenters and joiners might influence the receipts of the charity. At the same time he had such confidence in the builders of London that he did not believe they would allow the Institution to dwindle for want of funds. It had now been in existence for many years, and had always managed to meet its requirements. The Committee would like to see the income increased, as they were only able to provide relief at present for one out of the four applicants, and thus three old people, who might not live long enough to benefit by the Institution, had to stand over for some time.

The Chairman also gave "The Worshipful Company of Carpenters," referring to their kindness in giving the use of their fine hall, and in subscribing largely to the funds of the charity.

Mr. B. J. Jacob (Warden of the Carpenters' Company) replied, and added that his only regret at these gatherings was that the subscriptions had not amounted to four figures.

Mr. J. W. Hobbs proposed "The Chairman," congratulating Mr. Nightingale on the manner in which he had fulfilled his duties. The trade had been passing through a most serious struggle, which had resulted in heavy loss both to employers and employed, and it required a brave man with such a fight looming in the distance, to undertake the Presidential duties.

The toast was received with acclamation, and the Chairman made a suitable reply.

Mr. Basil Peto gave "The Architects and Surveyors." Although actuated with the best feelings in the world, the builder and the architect, towards the end of a job, sometimes had little differences of opinion, and had then to call in the help of the surveyor, who acted as a great "make-peace." They could not forget, too, that most important matters connected with the building trade were now under the arbitrament of the President of the Royal Institute of British Architects. His only regret was that more architects were not present at these dinners.

Mr. Howard Clarke replied on behalf of the architects, who, he said, were not without their troubles. The architects of the present day were doing their best to improve London and the provinces, and he need only instance such buildings as the new Metropolitan Assurance office in Moorgate-street, the new buildings of the Chartered Accountants, and such buildings as were to be seen on the Thames Embankment, which were worthy of all time.

Mr. Northcroft replied in a humorous speech on behalf the surveyors.

The remaining toast, viz., "The Vice-Presidents, Committee, and Stewards," was proposed by Mr. Maton, and responded to by Mr. J. T. Bolding.

In the course of the evening, subscriptions and donations to the amount of 836*l.* were announced, of which sum 576*l.* appeared in the President's list, including his own donation of 100*l.*

## Correspondence.

*To the Editor of* THE BUILDER.

### "CONCRETE BUILDING."

SIR,—In reply to Messrs. J. Birch & Co.'s inquiry I beg to say that I am the patentee and manufacturer of Henley's patent revolving and self-fastening concrete building apparatus, and if they will kindly communicate with me I shall be pleased to give them any information they require with reference to it.

W. J. E. HENLEY.

34, *Oakfield-road, Anerley, S.E.*
November 5, 1891.

A TRADE FESTIVITY.—The well-known business of Mr. James Hill, Queen Victoria-street, has just attained its majority, and the event was celebrated on Monday, the 9th inst., at the Holborn Restaurant, by a dinner. Mr. Hill occupied the chair, and there was a large gathering of friends and employés. A very pleasant evening was spent, the usual toasts being interspersed with songs, musical sketches, &c. The principal toast was, "Success to the Firm," and this was suitably responded to by Mr. Hill and his two junior partners, Mr. How and Mr. King.

# The Student's Column.

## MARBLES.—XX.

A CONGLOMERATE which takes a fairly good polish is found at Draycott, in Somersetshire. The material is very hard, and has some analogy with the "Hertfordshire puddingstone" in regard to structure and composition. It differs from the latter in that it is decidedly more handsome, and its matrix is frequently somewhat softer. The small pebbles and fragments of which it is made are exceedingly hard, however, and the stone is, in consequence, very difficult to work. It presents a brecciated appearance, and has a red ground, with patches of different colours, reddish white, black, &c.

Near Bristol there is a marble from the Penarth or Rhætic beds, having a light yellowish brown base, with darker markings of a dendritic character, the general resemblance of which to certain forms of scenery has earned for it the name of "landscape marble." It is an argillaceous limestone, never occurs in large blocks, and has been principally used in mosaic work and minor ornaments.

The Quantock Hills marbles, which are green and grey in tint, have been used in the pulpit of St. Mary's Church, Taunton.

Several varieties of ornamental stones are exhibited in the Jermyn-street Museum from rocks of the Carboniferous formation, near Bristol, especially from those at Clifton. These are all fossiliferous; crinoids are often common, and fish palates are detected in some.

A Jurassic marble, composed almost entirely of small *Ammonites*, and much used in the district, was once quarried near Frome, in Somersetshire.

The "ragstone" of the Lincolnshire oolite formation was extensively quarried for ornamental purposes in the Middle Ages. The hard, blue, shelly limestones of the series found along Alwalton Lynch took a good polish, but were not very durable. All the marble "pits" in the district are now closed. Alwalton marble was employed in the Early English portions of Peterborough Cathedral, as a substitute for the celebrated Purbeck marble, in the small clustered columns. In certain quarries near Stamford a series of marly and crystalline beds, 30 ft. in thickness, occurs in the Lincolnshire Limestone, and the harder strata are very fossiliferous, containing zones of coral. A particular bed (containing much coral, many *Nerineæ*, and other fossils), very crystalline and taking a high polish, was formerly called "Stamford marble," and was much used for chimney-pieces. The bed is still present in the quarries, but its mineral conditions are so altered as to render the stone unfit for ornamental purposes. Very similar marble was obtained from Weldon, near Kettering. Their historic associations are the only interesting features connected with the marbles from the Lincolnshire oolite; there is no likelihood of their again being employed on an extensive scale for decorative purposes; the "ragstone" is, as a rule, much broken up by lines of jointing, and large slabs are not often obtainable. The material, however, is very abundant, and could be made available for mosaic work and small ornaments.

At Stainton, near Dalton-in-Furness, a material known as New England marble is raised. Mr. Lee says* that there are two varieties of it; one is of a light fawn-colour without much veining, the other is of a darker ground, being marked and veined with purple and brown. The workings are favourably situated; the Furness Railway Company has a branch line running through them, and the railway-station at Dalton-in-Furness is only 1½ miles distant. The marble is found in some very old work at Holker Hall, the seat of the Duke of Devonshire, but it does not appear to have become generally known until after the year 1858, since which time the quarries have been vigorously worked. It is stated that about one hundred men are engaged in the industry.

Grey marble is found at Kendal, in Cumberland.

A dark, brownish-black stone known as Frosterley marble comes from the Carboniferous Limestone near Stanhope, in Durham. It is highly fossiliferous, being almost entirely composed of corals, and takes a good polish. Fine examples of this may be seen, amongst other places, in Truro Cathedral.

* "Marble and Marble Workers," 1888, p. 33.

### ENGLISH ALABASTER AND GYPSUM.

The deposits of gypsum from which English alabaster is chiefly obtained, occur on two widely separated geological horizons. The more recent of these is in the newer Jurassic rocks, and is represented by the very exceptional deposit now being worked at Netherfield, near Battle. The older and much better-known horizons occur on two platforms in the New Red rocks, between the base of the Rhætic and the top of the Carboniferous formations. Mr. J. G. Goodchild, F.G.S., of the Geological Survey, states* that the chief masses of gypsum are found along two particular zones in these rocks. Extensive deposits of the material occur almost exclusively in the form of irregular, concretionary, nodular masses; which alternately swell out into thick beds of pure gypsum, or pass horizontally into selenitic clays. The beds of more persistent character are found immediately above or below the Magnesian Limestone of the north of England. These have long been worked in open quarries in the lower parts of the basin of the river Eden, between Appleby and Carlisle. The fibrous part of gypsum is almost invariably confined to veins traversing gypsiferous strata. The fibres are very often perpendicular to the walls of the vein; and they are frequently more or less bent, apparently resulting from differential movements of the matrix. Some of its purer varieties are known as "Satin Spar," and these form the chief ornamental stones.

Owing to the presence of oxide of iron and other impurities, British alabaster is rarely uniform in tint, and is generally clouded and streaked with red. Professor Hull says† that the locality which probably yields the largest quantity of English gypsum is Chellaston Hill, near Derby. There the mineral occurs in a continuous bed, sometimes 12 ft. in thickness, outcropping round the flanks of the hill. It is associated with beautiful bands of the fibrous variety, the "fibres" being arranged in a position at right-angles to the bedding planes. The gypsum of this locality is seldom sufficiently pure to be employed for ornamental purposes, and is chiefly used in the manufacture of plaster of Paris.

Other localities where the material is found are Orston, near Grantham, round Newark-on-Trent, and at Droitwitch, in Worcestershire. At Fauld, in Staffordshire, an exceedingly handsome stone, with red and brown veins, occurs. A large pedestal and tazza of this alabaster may be seen in the Jermyn-street museum, and Mr. Lee states that the stone has been lately used to advantage for balusters, altar panelling, and the like. Gypsum is also found at several places in Nottinghamshire; at St. Bees' Head, Whitehaven; Alston, in Cumberland; the Isle of Purbeck; and near Watchet, in Somersetshire.

The deep sub-Wealden boring, near Battle, although it did not prove the existence of the Coal Measures in that part of Sussex, or even reach the Carboniferous rocks, was successful in demonstrating the existence, at a moderate depth from the surface, of valuable beds of gypsum, which are now being exploited at Netherfield, so that the boring experiment, apart from its philosophic interest, cannot be said to have been altogether a failure.

Most of the alabaster used in the construction of tombs and statuary in English cathedrals and churches probably came from the Continent. Prof. Hull concisely sums up‡ the value of gypsum as an ornamental stone in the following terms:—"Though gypsum is of less value and inferior in durability and beauty to some varieties of marble, it is extremely useful as an adjunct in the arts, and in making copies of works which are only within reach of the few. One of the most successful of these attempts at imitation is the copy of the Florentine Cup by Benvenuto Cellini, which is in the Museum of Practical Geology."

Questions have frequently arisen respecting the methods adopted by Italian workers in alabaster in imparting to the material a superficial resemblance to true marble, and it may not be uninteresting to our readers to say a few words on one of the processes. Italian alabaster is, when first quarried, semi-transparent, and it is wrought whilst in that state.§ It is subsequently rendered white and opaque (like marble) by placing the sculptured objects in a vessel of cold water, which is slowly raised to the boiling-point. Then it is permitted to cool to a temperature of about 70 deg. or 80 deg. Fahr., when the objects are taken out and wiped dry. At first they appear very little altered, but gradually assume the desired colour and opacity.

* "Proceedings Geologists Association," 1889, pp. 433, *et sqq.*

† "Building and Ornamental Stones," 1872, p. 162.

‡ *Op. cit.*, p. 168.

§ Consult Appleton's "Dictionary of Mechanics," vol. ii., p. 387.

### SCOTCH MARBLES.

Although many handsome varieties of marble exist in Scotland, and in great quantity, they are not worked to an appreciable extent. In some cases this is apparently due to distance from convenient carriage; in others, strange to relate, to a lack of commercial interest in the material. We do not intend to describe in detail the polished hand specimens which have, from time to time, been on show at various exhibitions, as in the present state of affairs they are of greater interest to the petrologist than to the architectural student. At the same time we cannot help remarking that with the great wealth of beautiful marbles at their command, it is incomprehensible why Scotchmen have not imported into the marble trade a little of that spirit which has raised their granite industry to its present flourishing condition. The lack of "sinews of war" might be pleaded as an excuse in some instances, but not in all.

A variety of marble is found at Tiree, in the Hebrides, and consists of a base of pink limestone, through which are disseminated crystals of a dark green mineral, giving the stone a porphyritic appearance. The proprietor, however, informs us that the Balephettish marble is not at present worked or sold,—and yet it is a most handsome stone; we have seen nothing like it from the Continent. In Glentilt, on the Duke of Athole's estate, there is a green-veined limestone which a former Duke utilised for mantel-pieces, &c. White marble is found at Assynt, in Sutherlandshire, and near Blairgowrie, Perthshire. A dark brown variety is raised in Lanark, and a black near Fort William. The varieties that could be obtained from the Isle of Skye are innumerable; and Iona is by no means destitute of good ornamental stones. The quarries of Cumnertrees, Dumfries, produce a dark-coloured shell marble; grey stones are found at Ballachulish (not worked), in Glencoe, and Aboyne, in Aberdeenshire.

Serpentine occurs at Portsoy, Banffshire, in various shades of green and red, variegated with veins of white steatite. The same decorative stone is found at a few other localities in Scotland.

## *SURVEYORSHIPS.*

WEST HARTLEPOOL.—At the monthly meeting of the Town Council of West Hartlepool, on the 3rd inst., Mr. W. J. Steele was unanimously appointed Assistant Surveyor, in place of Mr. M. Scott, who was recently appointed Surveyor of the new borough of Thornaby (South Stockton). Mr. Steele served his articles with Mr. J. W. Brown, A.M.I.C.E., Borough Engineer of West Hartlepool, in whose office he is now engaged.

## *OBITUARY.*

MR. J. THORNHILL HARRISON, C.E.—We regret to announce the death of Mr. J. Thornhill Harrison, one of the Engineering Inspectors of the Local Government Board. He died on the 4th inst. at his residence, Thornhill, Castlebar-hill, Ealing, where he lived for twenty years, after about a week's indisposition, his death being attributable rather to the complete breaking up of the physical powers than to any specific disease. The deceased was born at Thornhill, county Durham, in 1815, and after being educated at Edinburgh University was articled to his brother, Mr. J. E. Harrison. Leaving his brother, Mr. Thornhill Harrison was engaged under Mr. Brunel in the construction of the Great Western and South Devon Railways. In 1865 he became a member of the Royal Commission on the Pollution of Rivers. He was afterwards appointed one of the Engineering Inspectors of the Local Government Board, and in that capacity held numerous inquiries in different parts of the kingdom. Mr. Harrison was a member of the Institution or Civil Engineers and a Fellow of the Geological Society.

LINCOLN CATHEDRAL.—In the description of Lincoln Cathedral which appeared in our columns last week, reference was made (in col. 1, p. 349) to some important discoveries made in the course of excavations there between four and five years ago. Those discoveries, as was stated, had been previously described in detail (with plans) in the *Builder*, but we accidentally made an error in the date mentioned in the footnote, where, *instead* of "May 7, 1887," we should have said "May 21, 1887."

## GENERAL BUILDING NEWS.

ART GALLERY AND MUSEUM BUILDINGS, WEDNESBURY.—On the 4th inst. a block of buildings was opened at Wednesbury which will be devoted to the purposes of a Municipal Art Gallery, Museum, and School of Art. The *Birmingham Daily Gazette* says that the architectural order of the Art Gallery is of the Renaissance period, with a façade in deep red brick and terra-cotta. The treatment of the façade is highly decorative. Right and left above the arch of the central entrance are niches which will shortly be filled with terra-cotta busts of the two first Mayors of the borough; and on the string-course are sunk medallions of Sir Christopher Wren, Sir Joshua Reynolds, Flaxman, and Sir Isaac Newton, representative of architecture, painting, sculpture, and science. The building is two stories in height. The main entrance is into a wide hall, with class-rooms right and left, from which springs a staircase leading in parallel flights to the galleries, which form the four sides of the staircase well. The stairs are of granite, and pilasters carry the balustrades of polished oak. The ceiling of the vestibule is arched, and memorial tablets of Sienna marble will be let into the walls. The internal decoration is in distemper. Behind the first elevation of the staircase, on the ground floor, is the museum, a room with a floor space of 34 ft. by 18 ft., and in the recesses on either side are rooms which can be utilised as class or retiring rooms. The four galleries are lighted from the roof through lanterns of dull ribbed glass running nearly the whole length of each room. The north and south galleries measure 50 ft. by 24 ft., with a height of 19 ft. to the cornice, and the east and west galleries, which complete the parallelogram, have about half this floor space. The architects for the buildings were Messrs. Wood & Kendrick, of West Bromwich, and the builder Mr. H. Willcock, of Wolverhampton.

ST. DAVID'S CHURCH, MORRISTON.—The consecration of the new Church of St. David's, Morriston, Glamorganshire, took place on the 15th ult. The church was designed by Mr. E. M. Bruce Vaughan, of Cardiff, and accommodates 600 worshippers. Mr. Wormleighton, sculptor, of Cardiff, carried out the decorative work in connexion with the church. The pulpit was made by Mr. Wm. Clarke, of Llandaff, and the reredos and altar were made by Messrs. Jones & Willis, and are both executed in oak from the designs of the architect. Both the church and school are heated by hot water, the apparatus being supplied and fixed by Messrs. Killick & Cochran, of Liverpool. The work has been carried out under two contracts, that for the foundations by Messrs. Jenkins Bros., of Swansea, and for the main structure by Mr. Joseph Gwyn, of Swansea. The total cost of the work will be about 3,700*l.*

RESTORATION OF MONEYMORE PARISH CHURCH, IRELAND.—On the 10th ult. Moneymore Parish Church was re-opened for public worship. The church has been practically re-built. In 1889, a fire broke out in the building, and the entire structure was almost demolished, little remaining but the outside walls and the tower. The work of restoration has been carried out by Mr. J. Smith, contractor, Belfast, from the plans and specifications by Mr. J. H. Fullerton, architect, Armagh, at a cost of upwards of 2,500*l.* The walls of the nave and wings have been renewed, the former being supported upon pillars of Aberdeen marble. The roof is of open pitch-pine timber work, and the chancel has been ornamented with a cathedral glass window. The nave and aisle are provided with Minton's encaustic tiling, and the church is heated by hot air, Grundy's patent. The pulpit has been restored with Caen stone, finished with marble pillars; and a font, reading-desk, and lectern have also been provided. The building is lighted by lamps, which have been obtained from Jones & Willis, Birmingham.

CATHOLIC CHURCH, PAISLEY.—On the 18th ult. the church erected by the members of St. Mary's Catholic congregation in the west-end of Paisley was formally opened. The church, which is situate near the head of George-street, has been erected from plans prepared by Messrs. Pugin & Pugin, of Westminster. Its style of architecture is Gothic. The length of the building is 120 ft. by 50 ft. broad, with a height of 60 ft. to the cross at the front of the edifice. Ground has been secured for the future extension of the building. The porch is placed leading from George-street. It is detached from the main building. The doors are surmounted by tracery work, crowned by a niche, in which a statue of the patron saint of the church is to be placed. The main window of the nave is in the front view of the edifice. It is placed above ornamental scroll-work, and consists of five lights, each 30 ft. in height. In the upper portions of the windows tracery work has been executed, and the window of the baptistry, which has three lights and adjoins the main window, has been similarly treated. Internally the church consists of nave and aisles. The nave is divided into six bays, which are separated from the aisles by octagonal pillars, composed of stone from the Giffnock Quarries. The roof is panelled and ornamented. There are seven three-light windows in the clear-story, and a similar number of lights in the aisles. The baptistry, confessionals, and organ-gallery are at the north end of the building, and the vestries are close to the chancel at the south end. The church has been built of red stone from Locharbriggs Quarry, and the cost of the building will be fully 5,000*l.* Accommodation has been provided for 900 worshippers.

THE WORCESTERSHIRE BRINE BATHS HOTEL, DROITWICH.—This hotel has just been opened. It is built in half-timbered style, the materials used being brick, timber, and rough-cast, at a cost of 15,000*l.* It includes coffee-room, drawing-room, ladies' writing-room, ninety-six separate bedrooms, and six suites of rooms. The architect is Mr. John Robert Nichols, of Birmingham; the contractor Mr. C. A. Horton, of Brierley Hill. The warming and culinary arrangements were supplied by Messrs. Clement Jeakes & Co., London; the lifts by Messrs. Waygood & Co., London; the sanitary arrangements by Messrs. Doulton & Co., London. The decorations have been carried out by Mr. Arthur Gee, of Stafford; the gas-fittings by Messrs. Winfield & Co., Birmingham; the electric bells by Mr. E. Hill, of Birmingham. The stained-glass work has been executed by Mr. S. Evans, of Smethwick. Messrs. White & Son, of Worcester, laid out the grounds under the direction of Mr. Parker, Mr. Corbett's head gardener.

PUBLIC OFFICES, SWINDON.—On the 21st ult. the new Public Offices which have been erected at Swindon were opened. The building has been erected by the New Swindon Local Board at a cost of some 9,000*l.* The contractor was Mr. John Reed, of Plymouth, and the architect was Mr. Brightwen Binyon, of Ipswich. There are two rooms capable of holding 500 or 600 people, with ante-rooms and all conveniences. The building is in the style of the Renaissance, and the tower has an illuminated clock.

CHURCH OF ST. MATTHEW'S, NEWPORT.—The foundation-stone of the new Church of St. Matthew's, at Barnardtown, Newport, Monmoutbshire, was laid on the 20th ult. by Lord Tredegar. The designs, prepared by Messrs. Graham, Son, & Hitchcox, of Newport, are for a building in the plain Gothic style of architecture, with random rock-faced Pennant stone walling and Bath stone dressings. The roof will be open timber and match-board, covered with slates. Seating accommodation will be provided for 525 persons. The internal walls will be stuccoed and the woodwork stained and varnished. A transept will emerge from either side, and there will be a choir vestry and organ-chamber, and provision is made for heating. The total cost of the work when complete will be about 3,500*l.*, Mr. Charles Lock, of Newport, being the contractor.

CHAPEL AND SCHOOL BUILDINGS, BURMANTOFTS, LEEDS.—On the 22nd ult., a new Congregational chapel and school, situated at the corner of Shakspeare and Azalea streets, Burmantofts, Leeds, was opened. The buildings will furnish accommodation for 450 worshippers and 400 school children. The new buildings, which are of brick, have been designed by Mr. Edward Dodgshun, and the principal contract was carried out by Messrs. Gould & Stephenson. The style of architecture is the Composite. The windows are filled with cathedral glass, and the gas lighting is by chandeliers hanging from the centre. The aisles on each side consist of triple arcades. At the front end there are side gables, and the windows are so arranged as to admit the introduction of an upper gallery and the carrying out of a tower and spire at one corner so as to finish the staircase. The façade is comprised of a gable with winged buttresses, a flat porch, with stone enrichments, projecting to the line of street. The pulpit and choir occupy the right-hand corner at the opposite end. The assembly-room or general schoolroom adjoins the back of the chapel, and by means of double-glass screens additional light, from the glazed roof and windows of the school, is thrown into the chapel. The woodwork of the structure is stained in green, save the bases of the pillars in the arcades, which are in chocolate. The chapel is seated with chairs. In the basement are seven class-rooms, infant schoolroom, preacher's vestry, and kitchen.

NEW BUILDINGS, INSTITUTION FOR THE BLIND, PLYMOUTH.—On the 20th ult., the new wing which has been added to the Devon and Cornwall Institution for the Blind, North-hill, Plymouth, was opened for use. The wing is situated on the north-east or Mutley side of the main building. It consists of a two-storied building, 60 ft. by 20 ft. The lower story consists of a large room, which will be devoted to small basket-making, and the upper story will be used for dormitories, lavatories, &c. There is a connexion with the main building in case of fire. Its cost will be about 1,200*l.* Mr. H. J. Snell was the architect, and the builder was Mr. May.

NEW EPISCOPAL CHURCH, MARYHILL, LANARK.—The memorial stone of St. George's Episcopal Church, Maryhill, was laid on the 24th ult. by Lady Campbell of Garscube. The new church is situated in Church-street. It is intended to accommodate 350 sitters, and consists of a nave, chancel, vestry, baptistry, and organ-chamber. The chancel is situated on the east of the nave, is semicircular in shape, having niche in outer wall and lancet-shaped windows. The vestry is on the west side, and communicates with the nave by a double arch, having a column with moulded capital and base between. The baptistry occupies a recess to the north, and directly opposite is the entrance porch, flanked on either side with stone buttresses and finished with gable, having a cross on its apex. The interior of the church will have an open timber roof, with bound couples resting on stone corbels on the side walls. Instead of plaster, the walls will be faced with red brick. The style is Early English. The architect is Bailie Petrie, Maryhill.

PARISH CHURCH, BALLYMACARRETT, BELFAST.—The foundation-stone of the new parish church, Ballymacarrett, was laid on the 26th ult. by the Lord Bishop of Down and Connor and Dromore. The new church, which will be cruciform, has been designed by Mr. S. P. Close, architect, and the contractors are Messrs. Dixon & Campbell.

ST. MATTHEW'S DAY-SCHOOLS, PRESTON.—On the 31st ult. the Mayor of Preston, Alderman Galloway, laid the foundation-stone of new schools which are being built in connexion with St. Matthew's Church, Preston. The schools are being erected at a cost of about 3,000*l.* The new buildings comprise on the ground floor, entrance, with stone staircase. The steps, which have no winders, are easy in rise, being 6 in. high and 12 in. wide. From this entrance access is obtainable to the cloak-room and main schools. The infants occupy the large school on the ground floor, 87 ft. by 57 ft. On the west side are three class-rooms, which run the full length of the main room; these are separated by framed, panelled, and glazed screens. Three public main entrances are provided. The general arrangement of the ground floor is repeated on the first floor. This will be used by the girls, and is provided with cloak-rooms, lavatory, &c., the height from floor to ceiling being 16 ft. Provision is made so that there will be communication between the existing and new schools, both on the ground and first floor. At the north-west end of the upper school an ante-room and a small boiler-room are provided. The ventilating, heating, and lighting have, it is said, been carefully considered. All floors will be laid in white boards, and are to be constructed sound-roof. The walls will be plastered throughout, above a cemented dado, which will be about 5 ft. high. The architects are Messrs. Myres, Veevers, & Myres, of Preston, and the works are being carried out under the supervision of Mr. T. Harrison Myres, F.R.I.B.A., by local sub-contractors. Mr. John Sergeant is the clerk of works.

MASONIC BUILDINGS, BIRMINGHAM.—On the 4th inst. the Masonic buildings in Severn-street, Birmingham, were formally opened after reconstruction. The front block is three stories in height, and consists of ante-rooms capable of accommodating 200 members. Entering from Severn-street, a tiled hall communicates with the ante-rooms and then into the lodge-room, where the rites and ceremonies of the craft are conducted. Daylight is entirely excluded. The walls are divided by pilasters supporting an entablature and coved ceiling. In the east, behind the Master's chair, is a Doric portico, and in the west is an organ-chamber, approached by a concealed staircase entered through the lodge-room. The architects engaged in the work of reconstruction and decoration were Messrs. Essex & Nicol, of Birmingham; the general contractor being Mr. Moorhouse, of Birchfield; the decorative work being carried out by Mr. John Taylor, of Birmingham.

NEW COUNCIL CHAMBER AT LEITH.—The new Council Chamber at Leith was inaugurated by the first meeting of the new Town Council being held in it on the 6th inst. The work of enlarging the Council Chamber was commenced in April of this year from plans by Mr. James Simpson, architect. The chamber is 34 ft. 9 in. by 22 ft., with a height of 17 ft. 6 in. An oaken floor has been laid, which is relieved in panels and border designs of walnut, while the walls, to the height of 4 ft. have been set with framed, panelled, and polished walnut. Above this panelling the walls have been plastered with Keene's cement, and the ceiling has been treated with stucco. The chamber is lighted by seven large windows, while artificial light is supplied from three Wenham lights. Cloak, retiring, waiting, and reading rooms have been provided.

## SANITARY AND ENGINEERING NEWS.

THE LIVERPOOL WATER SUPPLY.—At a meeting of the Liverpool Town Council, on the 28th ult., a supplementary estimate of 10,000*l.* was voted for the Vyrnwy Works, and the chairman of the Water Committee (Alderman John Hughes), speaking on a proposed arrangement for putting an end to the existing contract with Messrs. John Cochrane & Sons, and for making a new arrangement with Mr. H. H. Cochrane and Mr. A. H. Cochrane to continue the execution of the works in connexion with the tunnel under the Mersey at Fidler's Ferry, said they could not expect men to continue a contract at a loss. The advice of Sir Benjamin Baker had been sought, and he had approved of an alteration in the shield in the tunnel under the Mersey. The present contractors had lost some 16,000*l.* or 17,000*l.* on their contract, and the Committee thought some regard should be had for this, and that it would be better to get these contractors to finish the work. The Corporation had in their hands 1,500*l.* lodged by the contractors as security,

and there was other money as well as machinery against the contract.

OPENING OF LOCHWINNOCH WATERWORKS.—On the 15th ult. the new reservoir situated on the Maich Water on Ladyland estate, two miles from Lochwinnock, Renfrewshire, was opened by County Councillor Joseph Johnstone. The work of supplying gravitation water to the village of Lochwinnoch was necessitated about nine years ago, owing to the existing wells becoming contaminated with sewage; and Messrs. Niven & Haddin, engineers, having prepared an estimate of the cost, the work of formation was given to Mr. L. H. Ballantyne. The reservoir has a capacity of between seven and eight million gallons. About four miles of piping have been laid, and at intervals fire-plugs have been attached to the main.

HEMSWORTH UNION WATER-SUPPLY.—The Rural Sanitary Authority of the Hemsworth Union are taking steps to procure a Provisional Order for acquiring lands and easements in connexion with an extensive system of water-supply. Nearly a year ago, the Authority instructed Mr. M. Paterson, M.Inst.C.E., to report upon a scheme of supply, in and for the Township of Hemsworth only. A source absolutely trustworthy could not be found within the prescribed limits, and Mr. Paterson then recommended the consideration of the question of a complete scheme for the whole Union. Instructions were given, and reports obtained on schemes of supply from the Pontefract Corporation and the Penistone Local Board works respectively, the water in both cases being pumped from subterranean sources, and both somewhat hard, being from 11 deg. to 12 deg. of hardness. After due deliberation, the Authority have decided to adopt a scheme suggested by Mr. Paterson, the source selected by him being the works of the joint Water Boards of Dewsbury and Heckmondwike. The water is said to be of exceptionally fine, pure, and soft character, from the elevated moorlands lying on the Derbyshire Boundary of the West Riding, above Penistone, and quite free from liability to lead poisoning. It is proposed to tap the Board's conduit a few miles from the source, and the supply will be by gravitation, the works consisting of a line of pipes about fifteen miles long; a service reservoir at Ringstone Hill, 402 ft. above sea-level; and about thirty-two miles of distributing mains. The estimated cost is 28,000*l*. The water is to be purchased in bulk, the maximum volume agreed upon being 400,000 gallons daily, and the whole scheme is designed to meet the wants of a population of 25,000.

NEW BRIDGE AT TWYFORD.—On the 9th inst. the new bridge over the Itchen at Twyford was tested and opened to the public. The old bridge was a narrow brick structure, spanning the river in four brick arches, and bearing a date stone "1750." It has for some time been known to be in a shaky condition, and, when uncovered, was found in a worse state than was anticipated. The "crowns" of the arches were cracked right across, and the wheels of vehicles had actually cut into them 1 in. or 2 in. The concrete foundations of the new bridge are carried down about 4 ft. 6 in. below the bed of the river to get a good bottom, and to avoid the possibility of the water scouring them out, and on these rise the solid brickwork supporting the platform of the bridge, which consists of corrugated steel, the corrugations being 1 ft. in depth, riveted to each other, and filled up with concrete. The parapets are of wrought iron, with scroll panels resting on cast-iron arches, and this light construction over the spans is balanced by solid brick wing walls, with stone caps, whilst the easy approaches contrast very favourably with the dangerous ones to the old structure. The test on the opening day was effected by driving a heavy traction engine over the bridge at various speeds, and gauging the deflection caused thereby by means of sliding rods underneath. The greatest deflection thus registered was $\frac{1}{16}$ in., which, compared with the Board of Trade, allowance for railway bridges of $\frac{3}{4}$ in. to every 100 ft., is considered to be a very satisfactory result. The engineer for the work was Mr. James Robinson, the assistant engineer being Mr. W. J. Taylor, A.M.Inst.C.E. The contractor was Mr. A. Thorne, whose representative on the works was Mr. Frank Proctor.

## *FOREIGN AND COLONIAL.*

FRANCE.—The Prefect of the Seine has asked the General Council of that Department for a credit of 114,000 francs for the work of clearing the Sainte Chapelle from the mean erections around by which it is encumbered.——In the Rue de Fouarre, close to the house occupied by the Société de l'Instruction Elémentaire, a bronze bust has been placed of Lazare Carnot, the grandfather of the President, who eighty years ago founded the society in question. ——A society called "The Sabretache" has opened subscriptions to set up a monument in the Garden of the Luxembourg to the lithographic artist Raffel, who lived near.——The Lyonnese painter, Adolphe Appian, has completed for the decoration of the new Hôtel of the Prefecture of the Rhône a large landscape which will be placed on the grand staircase. It represents the banks of the river Ain, evening.——A new college is to be built at Toul (Meurthe-et-Moselle), and the Government is to contribute half the cost of construction.——An association has been formed at Lyons with the object of bringing a supply of drinking water from Lake Annecy.——It is announced that the Conseil-Général des Ponts et Chaussées has a second time unanimously rejected the scheme for connecting Paris with the sea.——The town of Dode has commissioned M. Recipou, sculptor, to execute a monument to the memory of Jules Grévy. It will represent the figure of the former President seated, with allegorical figures on each side of the pedestal symbolising "Force" and "Justice." This part of the monument will be backed by a pyramid or stele decorated with attributes of the Republic, the whole on a granite base decorated by a ship ornamented with the bust of the Republic. It will be approached by a flight of granite steps. On the sides will be marble tablets on which will be inscribed the names of the communes which participated in the "conscription publique."——The Minister of Public Instruction has decided that the exhibition of the works of Meissonier will take place at the Ecole des Beaux-Arts, in the large room on the first floor, from the 1st to the 31st of May next.——M. Gerôme has been elected a foreign member of the Fine Art Academy of Belgium.——The Municipal Council of Paris has presented to Moscow the documents, albums, drawings, &c., which formed the substance of the "Ville de Paris" contribution at the Moscow exhibition. The objects are to form the nucleus of a technical museum at Moscow.——It is stated positively that the City of Lyons intends to construct at the summit of the hill of Fourvière a tower similar to the Eiffel Tower, the construction of which will be entrusted to M. Eiffel.——At Sèvres, last Sunday, the monument to Gambetta, raised by the people of Alsace-Lorraine, was inaugurated.——There is talk of converting the terrace which extends along the Luxembourg building towards the garden into a glazed gallery, so as to form a new sculpture gallery where the latest requisitions from the salons may find place. ——Twenty-seven architects have taken part in the Chaudesaigues competition; the Académie des Beaux-Arts has retained a dozen for consideration. ——At the end of the month a new railway will be opened, intended to unite Nantes with Argenteuil. It will not only form an important strategic line, but will also give access to some of the prettiest places in the neighbourhood of Paris, Corneilles, Herblay, Andresy, &c.

BERLIN.—The subject for the annual Schinkel Competition (1892) has been selected. The gold medal and travelling studentship are to be given to the author of the best design for some monumental baths, to be planned in accordance with the requirements of a fixed programme.——The annual competition for civil engineers will have for its subject a harbour for inland water traffic situated on the river Spree above Berlin.——In connexion with the biennial gathering of the amalgamated societies of architects and civil engineers, to be held at Leipsic next year, a volume treating of the buildings of this city will be published as an addition to the series of similar publications on the other more important cities of the Empire.——The gathering of these societies in 1894 will probably be held at Berlin.——A thorough investigation of the remains of the old Roman border line which runs through Germany is to be made. The Government intends voting a sum of 10,000*l*. for this purpose, and will elect a special committee to take the matter in hand.——According to Professor von Werner's notes on the financial success of the late International Art Exhibition, it appears that of the 5,000 works of art exhibited, some 400 were sold for a total sum of nearly 800,000 marks. The profits made by the arrangement of the exhibition amount to 110,000 marks, or 5,500*l*. The management of the International Art Exhibition was in the hands of the "Verein Berliner Kuenstler," a private body that had voluntarily taken the matter in hand in the place of the exhibition committee of the Prussian Royal Academy, whose duty it is to arrange the annual *salons* at Berlin. The "Verein Berliner Kuenstler" has now petitioned the Emperor for the permission to arrange the annual exhibition regularly.——Berlin art is to be well represented at the Chicago Exhibition. Herr Anton v. Werner will take the matter in hand, his intention being to use his influence in obtaining a first-rate selection of the works of art to be sent.—— The so-called "German Bank" has opened some new extensive business premises, erected from the designs of Herr Martens, a specialist of repute for this class of work. In the basement and cellars of the main building some large public safe-deposit vaults have been planned. These show some interesting fire and thief-proof construction. ——In the annual report of the Berlin Electro-technical Society, we see a statement to the effect that the Empire (excluding the Kingdoms of Bavaria and Wurtemberg) now has 275 cities and towns supplied with a system of public telephonic intercommunication, the management of which is in the hands of the Government. These 275 places have in total 58,500 call points, on which the average of daily conversations number 640,000.

WATER SUPPLY OF FLORENCE.—The *Times* correspondent writes from Florence on the 9th that Sir Douglas Galton, who has been commissioned to draw up a report regarding the water supply of the city, has visited all the public waterworks, and will shortly submit his report to the Mayor. Mr. Deacon, the engineer, has presented a scheme for providing Florence wish a pure and abundant supply of water, to be obtained from a source above the Bisenzio Valley. From the *Times* correspondent's communication, it is not very clear whether Sir Douglas Galton and Mr. Deacon are working in conjunction, or as supporters of rival schemes. In either case, it is satisfactory to find there is a chance of the Florence water supply being improved. It is high time that it should be.

VIENNA.—The Imperial Academy has sent out two archæologists to the south of Asia Minor. Some extensive excavations are to be made at the expense of the reigning head of the Duchy of Liechtenstein.——A solemn memorial ceremony to the deceased architects, Ferstel, Hansen, and Schmidt is to be arranged by the architectural societies this winter.

LEIPSIC.—The Biblioteca Albertina, a new building destined to hold the 400,000 volumes of the University Library, has just been opened. The architect, Herr Rossbach, has designed his façades in Italian Renaissance, using some Vienna buildings as his model. The material used on the fronts is a freestone. The building is one of the imposing group being erected outside the city wall. Of this group, the new Concert Hall, the Conservatoire, the Art Schools, and the Police Headquarters, are already in use.

SWITZERLAND.—The idea of erecting an observatory on the summit of Mont Blanc will probably have to be given up owing, to the impossibility of obtaining a good foundation. The thickness of the snow on top of the rock must exceed 28 mètres, borings to this depth having been made without touching stone. The preliminary works are being carried out under the directions of engineer Imfeld, who has taken up quarters at the Vallot Observatory, some 4,000 mètres above sea level. Both he himself and his men have suffered great privations during the work.

## *MISCELLANEOUS.*

CITY AND GUILDS OF LONDON INSTITUTE.—From the report of the Examinations Department, we learn that the Institute's thirteenth examination on Technology was held in April and May of the present year. There was a much larger increase in the number of papers examined and of passes than in the two previous years. At the recent Examination the total number of worked papers was 7,416, as against 6,781 in 1890, showing an increase of 635, the corresponding increases in the two previous years being 175 and 440. This year, too, there is not only an increase in the number, but also in the proportion of candidates who have succeeded in satisfying the examiners, the number of passes being 4,099 as against 3,507 in 1890, and the percentage of passes 55·3 as against 51·8. Examinations were held this year in 53 as against 49 subjects in the previous year, and in 245 as against 219 different centres throughout the country.

SANITARY PROGRESS IN JAPAN.—The report issued by Nagayo Sensai, the director of the Sanitary Bureau of Japan, refers to 1888 and 1889 as years in which no special epidemic occurred, and during which substantial progress was made in promoting the sanitary circumstances of the empire. On several occasions since 1877 Japan has been visited by terribly fatal epidemics of cholera, the last of these having prevailed during 1885-86, and, though certain costly measures were adopted on each occasion, these were, after all, only such as dealt with an already existing disease; they were essentially temporary in character, and they did but little to prevent the recurrence of any similar epidemic. But since 1886 a different line of action has been adopted. The public have been educated to understand that improved water services and efficient sewers and drains are necessary if disease is to be prevented, and though the remedy must be a costly one, and must be continued over a long series of years, yet it has now been initiated in good earnest. In 1888 Mr. W. K. Burton, an Englishman who is professor of sanitary engineering in the Imperial University, was engaged by the Home Department to advise the Government as to the needed sanitary instructions; officials have since been provided to assist him, and the report adds that "the construction of waterworks and the improvement of drains and sewers have commenced in every part of the country." The work would seem to be largely carried out under a system of local government, for we read that when such works are in contemplation in the various districts, word is sent by the central department that if advice and counsel are needed any demand for assistance will be complied with.—*The Lancet.*

ROBERT BOYLE & SON (LIMITED).—The directors of Robert Boyle & Son (Limited), ventilating engineers, London and Glasgow, have resolved to recommend a dividend of 12½ per cent., free of income-tax, on the ordinary and deferred shares of the company for the year ending September last, after placing to the reserve fund one-sixth of the profits earned. This, we are informed, makes the sixth dividend, 12½ per cent. being paid for the last two years, and 12 per cent. for the previous years. The year ended has been the most profitable since the formation of the company, which has at present some important contracts in hand.

# COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

## COMPETITION.

| Nature of Work. | By whom Advertised | Premium. | Designs to be delivered. |
|---|---|---|---|
| *Designs for Lunatic Asylum | Sunderland Lunatic Asylum Com. | 100*l.* 75*l.* and 50*l.* | No date |

## CONTRACTS.

| Nature of Work or Materials. | By whom Required. | Architect, Surveyor or Engineer. | Tenders to be delivered. |
|---|---|---|---|
| *Road Works | Southend Local Board | P. Dodd | Nov. 17 |
| *Sewerage Works | Hatfield Union | G. M. Lawford | do. |
| Long Wire Fencing, Breadalbane, N.B. | James Wyllie | ..... | Nov. 18 |
| Six Houses, Readland | Bristol Watch Com. | Crisp & Oatley | do. |
| Schools and House, Birdwell, nr. Barnsley | Worsbro' School Board | Senior & Clegg | do. |
| *Repairs to Buildings, &c. | St. Saviour's Union | Jarvis & Son | Nov. 19 |
| New Premises, The Hayes, Cardiff | Morgan & Co. | P. Price | do. |
| Wesleyan Chapel, Pentre Rhondda | Rev. J. B. James | ..... | Nov. 20 |
| *Removal of Refuse, &c. | St. Mary Vestry, Battersea | *Official* | do. |
| Dwelling-house and Stable, New Dolphin, Queensbury | ..... | John Drake | Nov. 21 |
| Additions, &c. to several Cottages, Leadgate, Durham | Consett Iron Co. | ..... | do. |
| *Broken Granite | Kingston-on-Thames C. | *Official* | Nov. 23 |
| Draining, Flagging, &c. | Levenshulme Loc. Bd. | J. H. Maybury | do. |
| Greenhouse, &c. Cemetery | Armley (Leeds) Burial Board | *Official* | do. |
| Additions and Alterations to "Queen's Hotel," Stockton-on-Tees | R. Fenwick & Co. | G. G. Hoskins | Nov. 24 |
| *Pipe Sewers with Manholes, &c. | Bexley Local Board | A. Williams & Son | do. |
| *Coastguard Station, Peterhead | Admiralty | *Official* | do. |
| *Roadmaking and Tar-paving Works | Lewisham B. of W. | do. | do. |
| *Alterations, &c. to Premises, London Central Meat Market, &c. | Commrs. of Sewers | do. | do. |

## CONTRACTS.—*Continued.*

| Nature of Work or Materials. | By whom Required. | Architect, Surveyor, or Engineer. | Tenders to be delivered. |
|---|---|---|---|
| *Sewerage Works | Midsomer Norton Loc. Bd. | C. N. Lailey | Nov. 25 |
| *Engine and Boiler Houses, &c. | St. Helens Corporation Waterworks | D. M. F. Gaskin | Nov. 26 |
| Railway to Aviemore (Moy contract) | Highland Ry. Co. | *Official* | do. |
| Girder Viaduct over River Findhorn | do. | do. | do. |
| *New Infirmary | Lichfield Union | W. H. Woodroffe | Nov. 27 |
| *Post-office, Lancaster | H. M. Works | *Official* | Nov. 30 |
| *Pipe Sewer and Accessories | Richmond U.R.S.A. | F. W. Shields | do. |
| *Baptist Chapel and Schools, Fenny Stratford | Building Committee | ..... | Dec. 1 |
| *Street Name Tablets | Bexley Loc. Bd. | ..... | Dec. 2 |
| *Erection of an Abattoir | Cheltenham Corp. | *Official* | do. |
| Relief Culverts, Malago Brook | Bristol Corporation | F. Fox | Dec. 7 |
| *Married Soldiers' Quarters, Devonport | War Department | *Official* | No date |
| Brick Sewer | Northampton Corp. | do. | do. |
| Weaving Shed, Warehouse, &c. Ovenden, Halifax | ..... | J. F. Walsh | do. |
| Reconstruction of "Royal White Lion," Hotel, Bala, N. Wales | ..... | W. W. Thomas | do. |
| New Sale Yard, Birmingham | ..... | J. & L. Lea & Sons | do. |
| Three Houses, Royal Park Estate, Headingley, Leeds | ..... | Swale & Mitchell | do. |

## PUBLIC APPOINTMENTS.

| Nature of Appointment. | By whom Advertised. | Salary. | Applications to be in. |
|---|---|---|---|
| *Assistant Clerk of Works | Fulham Vestry | 2*l.* 5s. per week | Nov. 17 |
| *Clerk of Works | Tottenham L. B. | 2*l.* 10s. | Nov. 21 |
| *Borough Surveyor | Dorchester T. C. | 200*l.* | Nov. 23 |
| Electrical Engineer | Huddersfield Corp. | Not stated | Nov. 25 |

*Those marked with an Asterisk (*) are advertised in this Number.* *Competition*, p. iv. *Contracts*, pp. iv., vi., *and* viii. *Public Appointments*, p. xx.

LECTURES ON ARCHITECTURE.—Mr. T. Locke Worthington is giving a series of twelve lectures on architecture at Hampton Court Palace on Friday afternoons at 2.30 p.m., the first having been given on Friday, the 6th inst. The first six will be given weekly up to December 11, and the course will be resumed after Christmas at dates to be announced. The lectures are given in connexion with the London Society for the Extension of University Teaching.

WHITE CEMENT.—A cement having the same general characteristics as Portland cement, but white in colour, may, according to the *Scientific American*, be made by grinding together three parts of chalk, one of kaolin, burning at red heat, and grinding again. The tensile strength, however, is only about half that of good Portland cement, but it is hoped this may be improved.

MARBLE SAWS.—At the marble works of Claudet Bros., at Clarens, Switzerland, there is now working some sawing machinery, made by Achard & Co., which is said to be giving very good results. The more notable features are the circular saws which are used for cutting up blocks of marble. These saws are of two kinds, a larger being used for blocks of a maximum height of 3 ft. 1 in. by 8 ft. 3 in. long, and 6 ft. 6 in. wide. A smaller machine is for blocks about 1 ft. in height. The larger saw is 7 ft. 3 in. in diameter, and is of steel with diamond teeth. The saw is mounted on a heavy steel spindle, the bearings of which are held steady by means of massive foundations. A screw-thread is cut on the spindle, so that the position of the saw can be altered to any part where it may be desirable to cut the block of marble. The shifting is effected by means of nuts. The block is secured to a carriage mounted on wheels, which, in turn, rest on a sliding bed. The latter serves to give the feed-motion, the wheeled carriage being secured in the required position by suitable clamps. The smaller saw is overhung, the bearings being carried in a heavy casting which can be adjusted vertically. In this way, any depth of cut can be obtained at will. The diamond cutters or teeth are mounted in small discs of steel, which, in turn, are fitted in holes drilled in the periphery of the saw-plate, being secured in position by means of tin solder. The teeth are placed alternately at each edge of the plate. The width of cut of the larger saw is $\frac{3}{32}$ in., and that of the smaller saw is $\frac{3}{16}$ in. About 1 square foot per minute is said to be the speed of cutting Carara white marble.

THE CRYSTAL PALACE ELECTRICAL EXHIBITION.—A meeting of the Honorary Council of Advice, and of the Special Committee appointed by the Electrical Section of the London Chamber of Commerce, will, by the permission of the Lord Mayor, be held at the Mansion House at three o'clock on the 25th inst., when a report of the progress of the Exhibition will be presented, and the question of how the Exhibition may best be used as a means of advancing the interests of Electrical Science will be considered. The Lord Mayor will preside. We understand that the whole of the space is now practically allotted, extra buildings having been erected for certain large installations which could not otherwise have been accommodated.

AN AMMONIA WHITE-LEAD PROCESS.—Numerous attempts have been made from time to time to manufacture white-lead in a cheaper, quicker, and less dangerous way than by the ordinary Dutch or stack process, but these attempts have for the most part failed, either in themselves or in their products. Our contemporary *Iron* directs attention to a new process made public last year by the inventor, Dr. R. W. Emerson MacIvor. When introduced, our contemporary says, that process did not contain all the elements of success, but it has since been improved and perfected by Dr. MacIvor in conjunction with Professor Watson Smith and Mr. William Elmore. The process is based on the discovery originally made by Dr. MacIvor that litharge is quickly acted upon by a solution of acetate of ammonia, setting free the ammonia and forming a white basic compound, which, when treated with carbonic acid gas, is capable of being transformed into basic carbonate of lead, or, in other words, the white-lead of commerce.

TO REMOVE OLD PAINT.—Scraping or burning off old paint is hardly expeditious enough for general purposes, and is also laborious. Soda and quicklime are far more thorough, and the paint is more quickly removed. The solution of half soda and half quicklime is thus made:—The soda is dissolved in water, the lime is then added, and the solution is applied with a brush to the old paint. A few moments are sufficient to remove the coats of paint, which may be washed off with hot water. Many preparations are sold for the removal of paint, all of them having some basis of alkali. A paste of potash and strong lime is far more effectual in operation, and the oldest paint can be removed by it. Afterward a coating of vinegar or acid should be used, to cleanse the surface before repainting. For removing varnish, spirits of ammonia is used, but it is a slow process, and several applications are necessary. Scraping and sandpapering can be employed, but it must be done carefully by experienced hands, or the surface of wood will be injured.—*Chicago Sanitary News.*

THE ENGLISH IRON TRADE.—Inactivity is still the prevailing characteristic of the English iron market, and prices generally are depressed. In the Glasgow warrant market there has been no business in Scotch warrants, and Scotch makers' iron is still very dull, with values receding in most instances. The Cleveland market is devoid of animation. No. 3 G.M.B. is a shade lower. The hematite pig-iron trade of the north-west is inanimate, and mixed numbers of Bessemer pig show a decline of 6d. per ton. Manufactured iron is in moderate inquiry; but steel remains inactive generally. The shipbuilding trade is somewhat brisker. The lock-out in the engineering trades on the north-east coast has ended; but engineers, on the whole, are only moderately employed. The coal trade is fairly active.—*Iron.*

A LARGE CHIMNEY.—An important chimney-stack has recently been erected at Halsbruecker Smelting Works, near Freiberg. The chimney is on high ground, so that the top is 656 ft. above the works. Part of this elevation is accounted for by rising ground, up which runs a flue, the total height of the chimney being 460 ft. The height of base is 29½ ft. The inside diameter of the stack at the top is 8 ft., and at the base it is 17 ft. 2 in. The thickness of the stack wall at the top is 10 in., and at the base 4 ft. 10 in. The outside batter of the stack is 1 in 50. Hard-burnt pressed bricks are used. They have a mean specific gravity of 2·05, and a resistance to crushing of more than 5,689 lbs. per square inch. The absorptive capacity measured by the increase of weight by immersion in weak acid and water is from 4·5 to 4·8 per cent.; which may be prononnced very good results. The mortar was one part by volume of cement, nine of hydraulic lime, and twenty of Dresden building sand. The inside bricks were treated with tar to prevent penetration of the chimney gases, and the entire outer surface was pointed with mortar, made of equal parts of sand and cement. The inside pointing was done with a mixture of four parts of Dresden sand to one of infusonal earth, boiled in tar and worked in hot. The brickwork was protected by iron rings placed at a distance of two-thirds the diameter of the stack at the corresponding level. The cap is of cast-iron. The total cost was 6,500*l.*, and the contractor was Mr. H. R. Heincke, of Chemnitz. The building material worked in consisted of 540 ten-ton truck loads.

THE NEW MAYOR OF CAMBRIDGE.—Notwithstanding the strike of the building operatives in Cambridge since July last, a very warm and hearty greeting was given on Wednesday evening by a large meeting of staff workmen in the employ of Messrs. Rattee & Kett, carvers and builders, of that town, to the senior partner of the firm, Mr. George Kett, who has been chosen Mayor for the ensuing year, and was presented by the staff with a handsome clock, two bronze figures, and a casket containing an illuminated address, accompanied by a booklet containing the names of 217 subscribers. The Mayor returned his thanks in a most heartfelt manner, amidst the acclamation of the crowded mill-room.

RAILWAYS IN ASIA MINOR.—M. Macan, manager of the great Cockerill Works in Belgium, has obtained a concession from the Porte for some important new railways in Asia Minor. The concession embraces the route from Sanyun, on the Black Sea, to Sivas, with permission to extend the line to Cæsarea and the Bay of Alexandretta, whereby railway communication would be established between the Black Sea and the Mediterranean. The concession covers some 1,000 miles of railway.

## *LEGAL.*

### A CURIOUS QUESTION AS TO BUILDERS LIABILITIES.

A CASE of considerable importance was decided last week in the Bloomsbury County Court by Judge Bacon. A Mr. and Mrs. Gruss, of Castle-street, W., sought to recover for goods stolen by a man in the employ of Messrs. Clarke & Mannooch, builders and decorators, the defendants in the present action.

Mr. Ormesby was counsel for the plaintiffs, and Mr. Hewitt, barrister, was for the defendants.

Plaintiffs' case was that the defendants were employed in April of this year to paint the front of their house in Castle-street. The whole work could be done from the outside; but on April 6, at the request of defendant's foreman, plaintiffs permitted one of the men to go into a bedroom, where there were several articles of jewellery in a drawer. When the man had left, which he did at four o'clock, nothing was missed; but some time afterwards the jewellery was missed. The man had not since been seen or heard of.

It was contended that the custom of the trade was to employ only men of good character, who could be trusted inside houses, and that enough care was not exercised in engaging the man who stole the jewellery. An attempt to prove that builders replaced goods stolen by men as a general rule failed, and

His Honour, without calling upon the defendants, said that unless the plaintiffs proved negligence on the part of the defendants they could not recover for such acts as these. There would be judgment for the defendants with costs, including special fee for counsel.

## MEETINGS.

SATURDAY, NOVEMBER 14.

*Junior Engineering Society.*—Visit to the Royal Institution Laboratories, &c., Albemarle-street, Piccadilly.

MONDAY, NOVEMBER 16.

*Royal Institute of British Architects.*—Mr. H. Favarger, of Cairo, on "Modern Egyptian Buildings." 8 p.m.
*Liverpool Architectural Society.*—Special meeting.

TUESDAY, NOVEMBER 17.

*Institution of Civil Engineers.*—(1) Mr. H. K. Bamber on "Portland Cement: its Manufacture, Use, and Testing." (2) Mr. A. E. Carey on "The Inspection of Portland Cement for Public Works." (3) Mr. William Smith on "The Influence of Sea-Water upon Portland-Cement, Mortar and Concrete." 8 p.m.
*Sanitary Institute (Lectures for Sanitary Officers).*—Professor A. Wynter Blyth on "Diseases of Animals in Relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food." 8 p.m.
*Statistical Society.*—Inaugural Address by the President, Dr. F. J. Mouat. 7.45 p.m.
*Glasgow Architectural Association.*—Mr. Archibald Macpherson on "The Scottish Mansion." 8 p.m.

WEDNESDAY, NOVEMBER 18.

*British Archæological Association.*—(1) Dr. Sparrow Simpson on "A Magic Roll in the British Museum." (2) Mr. Walter F. Reid on a "Pre-historic Bronze Foundry at St. Columb, Porth." 8 p.m.
*Society of Arts.*—Opening Address of the Session by the Attorney-General, Sir Richard Webster, M.P. 8 p.m.
*London Society for the Extension of University Teaching (Chelsea Centre).*—Mr. A. H. Fison, D.Sc., on "Electricity and its Modern Applications." VII. 8.15 p.m.
*Royal Meteorological Society.*—Four papers to be read. 7 p.m.

THURSDAY, NOVEMBER 19.

*Institution of Civil Engineers.*—Students' visit to the works of Messrs. Samuda Bros., Isle of Dogs, Poplar, E. 2 p.m.

FRIDAY, NOVEMBER 20.

*London Society for the Extension of University Teaching (Hampton Court Centre).*—Mr. Locke Worthington on "Architecture." III. 2.30 p.m.
*Sanitary Institute (Lectures for Sanitary Officers).*—Mr. J. F. J. Sykes on "Nature of Nuisances, including Nuisances the Abatement of which is difficult." 8 p.m.

## SOME RECENT SALES OF PROPERTY:

### ESTATE EXCHANGE REPORT.

NOVEMBER 2.—By *Driver & Co.*: 10, Lyndhurst-rd., Peckham, f., r. 36*l.*, 500*l.*

NOVEMBER 3.—By *P. D. Tuckett*: f.g.r. of 65*l.* per annum, Portsmouth, 2,020*l.*—By *Marler & Bennett*: f.g.r. of 232*l.* 5s., with reversion in 78 yrs., Sloane-st., S.W., 6,970*l.*—By *Reynolds & Eason*: 3, 5, and 7, Morton-rd., West Ham, u.t. 88 yrs., g.r. 5*l.*, 285*l.*; 26, Union-sq., Islington, u.t. 45 yrs., g.r. 7*l.* 15s., 460*l.*; 3, Osborne-ter., Clapham-rd., u.t. 37 yrs., g.r. 3*l.* 15s., r. 42*l.*, 340*l.*; 4, Osborne-ter., u.t. 37 yrs., g.r. 3*l.* 15s., r. 45*l.*, 335*l.*; Osborne-ter., i.g.r. of 15*l.*, u.t. 37 yrs., g.r. 7*l.* 10s., 110*l.*—By *Debenham, Tewson, & Co.*: No. 212, Strand, f. r. 200*l.*, 7,300*l.*; 1 to 4, Euston-grove, Euston-sq., u.t. 17 yrs., g.r. 9*l.*, r. 222*l.* 10s., 2,140*l.*; Nos. 160 and 162, Haverstock-hill, u.t. 59 yrs., g.r. 30*l.*, r. 160*l.*, 1,220*l.*; 1, 3, and 4, Maitland-villas, u.t. 60 yrs., gr. 35*l.* 18s., r. 195*l.*, 1,365*l.*; 2, Fordingley-rd., Paddington, u.t. 89 yrs., g.r. 8*l.*, 500*l.*; 174, Adelaide-rd., Hampstead, u.t. 61 yrs., g.r. 14*l.* 14s., r. 90*l.*, 800*l.*; 36, Ampthill-sq., Hampstead-rd., u.t. 51 yrs., g.r. 12*l.*, r. 89*l.* 10s., 760*l.*—By *Daniel Watney & Sons*: "The Willows," Church-st., Stoke Newington, f., sold before auction: f. land, Clissold-rd., about 9a., 26,100*l.*; "Warwick House," Paradise-row, f., r. 63*l.*, 1,000*l.*; f.g.r. of 30*l.*, with reversion in 30 yrs., Park-lne, 350*l.*; f.g.r. of 11*l.*, with reversion in 57 yrs., 370*l.*; f., r. 50*l.*, 2, Pk.-lane; and the residence, "Ingleside," f., r. 45*l.*, 950*l.*; "Woodhatch Cottage," Pk.-lane, f., r. 30*l.*, 510*l.*; f.g.r. of 25*l.* 10s., with reversion in 31 yrs., 930*l.*; "Gordon Cottage," and 0a. 1r. 36p., f., r. 25*l.*, 1,820*l.*; the reversion to "Kelvedon House," Willow-walk, in 57 yrs., 60*l.*; "Thistleton House," Clissold-rd., u.t. 57 yrs., g.r. 16*l.*, 800*l.*; the residence called "The Hall," Plaistow, f., 1,400*l.*; two plots of freehold land, Balaam-st., 600*l.*

NOVEMBER 4.—By *T. N. Turner*: 47, Waverley-rd., Paddington, u.t. 58 yrs., g.r. 5*l.*, r. 36*l.*, 250*l.*; 54, Archer-st., u.t. 52 yrs., g.r. 7*l.* 7s., r. 55*l.*, 500*l.*—By *Edwin Smith & Co.*: 16 and 17, Lower Lawn-rd., Hampstead, u.t. 59 yrs., g.r. 14*l.* 14s., 490*l.*—By *Toplis & Harding*: 18, Brewer-st., Golden-sq., f., r. 80*l.*, 2,200*l.*; 27 and 28, Little Earl-st., f., r. 160*l.*, 3,200*l.*; 51, Carnaby-st., Regent-st., f., r. 60*l.*, 1,140*l.*; 10, Devonshire-st., Bloomsbury, f., r, 55*l.*, 940*l.*; 5, Barrett-st., Manchester-sq., f., r. 55*l.*, 1,070*l.*; 47, Red Lion-st., Clerkenwell, f., r. 75*l.*, 1,100*l.*; 12, Three Colt-st., Limehouse, f., r. 30*l.*, 370*l.*; 14, Three Colt-st., and 35, Church-row, f., 62*l.*, 550*l.*; 3 and 8, Sun-st., Bishopsgate, f., r. 80*l.*, 1,335*l.*—By *P. Hodson*: 41, 43, 50, and 62, Ingleton-st., Brixton, u.t. 12 yrs., g.r. 9*l.* 4s. 6d., 250*l.*; 3 and 5, Ravenscourt-gar., Hammersmith, u.t. 34 yrs., g.r. 10*l.*, r. 62*l.*, 375*l.*—By *R. Kennett*: 3, Edith-villas, Edmonton, u.t. 82 yrs., g.r 4*l.*, 37*l.*

NOVEMBER 5.—By *Newbon & Co.*: No. 60, Camden-sq., u.t. 53 yrs., g.r. 6*l.*, r. 55*l.*, 500*l.*; 41 and 43, Prestbury-rd., Upton-pk., u.t. 92 yrs., g.r. 7*l.*, 205*l.* By *Messrs. Chadwick*: Lyndhurst-rd., Peckham, f.g.r. of 20*l.*, with reversion in 58 yrs., 640*l.*; f.g.r. of 75*l.*, Lyndhurst-rd., with reversion in 62 yrs., 2,040*l.*; f.g.r. of 31*l.* 4s., Cambridge-ter., with reversion in 62 yrs., 875*l.*; f.g.r. of 39*l.* 0s. 6d., Lyndhurst-rd., with reversion in 65 yrs., 1,075*l.*; f.g.r. of 31*l.* 10s., Ellesmere-ter., with reversion in 65 yrs., 860*l.*; f.g.r. of 12*l.*, William's-pl., with reversion in 65 yrs., 340*l.*; f.g.r. of 3*l.* 10s., South-pl., with reversion in 59 yrs., 110*l.*; f.g.r. of 310*l.*, Chadwick-rd., with reversion in 73 yrs., 9,000*l.*; f.g.r. of 24*l.*, Grove-pk-rd., with reversion in 58 yrs., 710*l.*; f.g.r. of 30*l.*, Camberwell-grove, with reversion in 61 yrs., 890*l.*; f.g.r. of 30*l.*, with reversion in 52 yrs., 920*l.*; f.g.r. of 12*l.*, New Cross-rd., with reversion in 69 yrs., 350*l.*; l.g.r. of 18*l.*, Victoria-rd., Peckham, u.t. 49 yrs., and two cottages, u.t. 49 yrs., g.r. 25*l.*, 630*l.*; 3, South-pl., f., r. 35*l.*, 710*l.*; 47, 49, and 51, Lyndhurst-rd., f., r. 96*l.*, 1,190*l.*; 26, Tooley-st., Southwark, f., r. 100*l.*, 2,150*l.*—By *Wilkinson, Son, & Welch* (at Brighton): 33, Lansdowne-pl., Hove, Brighton, f., 1,700*l.*; 11, Gloucester-pl., Brighton, f., r. 84*l.*, 1,410*l.*

NOVEMBER 6.—By *Bray, Young, & Co.*: 112, 114, 116, and 118, Archway-rd., Highgate, u.t. 88 yrs., g.r, 40*l.*, r. 270*l.*, 2,250*l.*; 12 and 14, Lansdowne-gardens, Lambeth, u.t. 70 yrs., g.r. 12*l.*, r. 68*l.*, 575*l.*; 2, Lansdowne-gardens, u.t. 70 yrs., no g.r., 390*l.*; 1 to 10, Pinder's-mews, u.t. 70 yrs., g.r. 3*l.* 1s., r. 86*l.* 8s., 200*l.*—By *Woods & Snelling*: 14 to 20, Anchor-yd., St. Luke's, f., 1,120*l.*—By *Moss & Jameson*: 1 and 2, Newton-st., High Holborn, u.t. 61 yrs., g.r. 60*l.*, r. 225*l.*, 2,550*l.*—By *Deverell & Co.*: f.g.r. of 15*l.*, Hemel Hempstead, with reversion in 95 yrs., 310*l.*

**[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]**

## RECENT PATENTS:

### ABSTRACTS OF SPECIFICATIONS.

15,782.—IMITATION STONE, SLATE, MARBLE, WOOD, &C.: *F. & A. Cheverall.*—Imitations are produced from cement and sulphate of iron. The surface of the slab is afterwards covered with colour, and then rubbed down with rotten-stone or such-like ingredient.

18,931.—BRICK-MAKING MACHINES: *W. Stevenson.*—Two or more bricks are delivered at a time by having the boxes made in duplicate and the pistons to force out the bricks arranged in order.

20,638.—BORING OR TUNNELLING MACHINE: *R. Stanley.*—The machine is driven by a rope, and is connected with the driving-belt or shaft. Shields are provided to protect the attendants, and the working is rendered safe and automatic.

17,902.—VENTILATING APPARATUS: *J. Leather.*—The air for ventilation is divided into two or more streams, so that the solid particles or objectionable matter is removed and only pure air admitted, louvres and deflectors are fitted to direct the current.

11,979. — COMPRESSED BRICKS: *H. Stephenson.* — Bricks, plastic or semi-plastic, are perforated while compressed by either taper or cylinder pins. The object is to prevent the discolouration often seen in bricks known as "hearting," the face of the bricks being of a different colour in the centre and at the outer edges when burnt.

15,228.—DRAUGHT REGULATORS: *A. & F. Voigtmann.*—Is a regulator for chimneys, stacks, and stove pipes, but improved by several simple details of cost and construction.

### NEW APPLICATIONS FOR LETTERS PATENT.

*October* 26.—18,364, R. Leaker, Louvre Windows.—18,374, T. Simpson, Window Fastener.—18,400, A. Wills, Supplying Disinfectants to Water-Waste Preventers or Cisterns.

*October* 27.—18,430, F. Cross, Stencil Plates.—18,435, G. Bratt, Locks and Latches.—18,457, J. Wood and others, Washdown Closet.—18,464, G. Farini, Door-spring buffers. — 18,487, R. Barker, Stone Cutting-machines.—18,509, C. Lavington, Device or Stay for the Guttering of Dwelling-houses.

*October* 28. — 18,543.—T. Garner, Stench-traps. — 18,532, F. Lynde, Construction of the Joints of Drain and other Pipes.—18,559, T. Arnold, Utilisation of Slag for the Manufacture of Blocks, Slabs, &c.

*October* 30.—18,708, T. Vicars and others, Bakers' Ovens. — 18,735, F. Moore, Paint-burner. — 18,757, A. Freeman, Preventing Down Draught in Fireplaces in Rooms, &c. — 18,765, P. Newton, Machines for Channelling Stone.—18,766, C. Chapman, Paving Roads, &c.—18,775, Siemens Brothers & Co., Limited, and others, Electric Bell Indicators. — 18,776, Siemens Brothers & Co., Limited, Boring Tools for Boring in Stone, &c.

*October* 31.—18,808, J. Ireland, Sea, River, or other Retaining Walls, &c.—18,824, A. Lutschaning, Ornamental Bricks, &c.—18,828, S. Crick, Fastening Doors, &c.—18,829, E. Porr, Impregnating Wood.—18,830, D. & H. Young, Hydraulic Jacks.

### PROVISIONAL SPECIFICATIONS ACCEPTED.

16,889, E. Preston and F. Ham, Lavatories and Water-closets.—17,056, W. Golden, Door and Gate Fastener.—17,189, T. Greenwood, Indicators for Ventilators.—17,398, J. Lilly, Apparatus for raising and lowering Props of Fanlights, &c.—17,619, S. Handscombe and W. Smith, Grinding Stones for Cement, &c.—17,632, E. Edwards, Artificial Stone.—17,946, J. Lewis, Wrought Window-frame.—18,077, W. Lindsay, Window-sashes.—18,085, A. Foppl, Construction of Roofs.

### COMPLETE SPECIFICATIONS ACCEPTED.

*Open to Opposition for Two Months.*

18,150, E. Marrer, Dados for Rooms, Picture Galleries, Exhibitions, &c.—1,553, W. Jackson, Movable Decorative Door-panels.—2,749, J. Young, Fixing Tiles or Panels in Stove-grates, without the use of plaster or cement.—11,768, W. Pattenden and A. Rindesland, Window-sashes and Frames.—16,663, H. Birkbeck, Machine for Boring Soil.

GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.—On the 7th inst. the students in the senior classes in Building Construction visited the Kelvinside Brick Company's brickwork and kiln, by the permission of the company. They were conducted by Mr. Williamson, the manager, who explained the whole process of manufacture. Afterwards the students visited Temple Church, New Kilpatrick. Mr. Aitken, the clerk of works, led the party over the building and explained many points of interest. Before leaving each place, the lecturer, Mr. Gourlay, proposed a vote of thanks to the gentlemen who had conducted them, which was in each case responded to.

## PRICES CURRENT OF MATERIALS.

| TIMBER. | | |
|---|---|---|
| Greenheart, B.G. ton | 9/0/0 | 0/0/0 |
| Teak, E.I... load | 8/10/0 | 14/0/0 |
| Sequoia, U.S.ft.cu. | 2/3 | 3/0 |
| Ash, Canada load | 2/5/0 | 4/0/0 |
| Birch, do. ..... | 2/10/0 | 4/5/0 |
| Elm, do. ..... | 3/5/0 | 4/15/0 |
| Fir, Dantsic, &c. | 2/0/0 | 3/10/0 |
| Oak, do. ..... | 2/10/0 | 4/10/0 |
| Canada..... | 4/17/6 | 6/10/0 |
| Pine, Canada red | 2/10/0 | 3/10/0 |
| Do, yellow .... | 2/0/0 | 5/0/0 |
| Lath, D'ntsic, fath | 5/0/0 | 6/0/0 |
| St. Petersburg | 5/0/0 | 7/0/0 |
| Deals, Finland, 2nd & 1st std 100 | 8/0/0 | 10/10/0 |
| Do, 4th & 3rd.. | 7/10/0 | 8/10/0 |
| Do. Riga ..... | 6/10/0 | 8/0/0 |
| St. Petersburg, 1st yellow .. | 10/10/0 | 15/0/0 |
| Do. 2nd yellow | 8/10/0 | 10/0/0 |
| Do. white .... | 7/0/0 | 10/10/0 |
| Swedish ..... | 7/10/0 | 15/10/0 |
| White Sea .... | 8/10/0 | 17/10/0 |
| Canada, Pine 1st | 13/0/0 | 25/0/0 |
| Do. do. 2nd.... | 9/0/0 | 16/10/0 |
| Do. do. 3rd, &c. | 6/10/0 | 10/0/0 |
| Do. Spruce. 1st | 8/10/0 | 10/10/0 |
| Do. do. 3rd & 2nd..... | 6/0/0 | 7/15/0 |
| New Brunswick | 5/10/0 | 7/10/0 |
| Battens, all kinds | 3/10/0 | 15/10/0 |
| Flooring Boards, sq., 1 in. prep. 1st ..... | 0/8/0 | 0/14/0 |
| Do. 2nd..... | 0/7/6 | 0/11/0 |
| Other qualities | 0/5/0 | 0/8/0 |
| Cedar, Cuba ..ft. | /3½ | /4½ |
| Honduras, &c. | /3½ | /4½ |
| Mahogany, Cuba. | /4½ | /6½ |
| St. Domingo, cargo av | /4½ | /8½ |
| Mexican do. do | /4 | /5 |
| Tobasco do. do | /5½ | /7 |
| Honduras do.. | /5½ | /6½ |
| Box, Turkey ton | 4/0/0 | 13/0/0 |
| Rose, Rio..... | 10/0/0 | 20/0/0 |
| Bahia ..... .. | 9/0/0 | 18/0/0 |
| Satin, St. Domingo ....ft. | 0/0/9 | 0/1/0 |

| TIMBER (*continued*). | | |
|---|---|---|
| Satin, Porto Rico | 0/0/10 | 0/1/6 |
| Walnut, Italian.. | 0/0/3½ | 0/0/7 |
| **METALS.** | | |
| IRON—Pig, in Scotland .....ton | 47/0/0 | 50/0/0 |
| Bar, Welsh, in London..... | 6/0/0 | 6/2/6 |
| Do. do. at works in Wales ..... | 5/10/0 | 5/12/6 |
| Do. Staffordshire, in London .... | 6/10/0 | 6/15/0 |
| COPPER—British, cake and ingot | 49/10/0 | 51/0/0 |
| Best selected .. | 51/0/0 | 52/0/0 |
| Sheets, strong.. | 60/0/0 | 61/0/0 |
| Chili, bars .... | 45/17/6 | 46/5/0 |
| YELLOW METAL lb. | 0/0/5½ | 0/0/6 |
| LEAD—Pig, Spanish....ton | 11/10/0 | 11/15/0 |
| English, com. brands ..... | 11/15/0 | 11/17/ |
| Sheet, English, 3 lbs. per sq. ft. and upwards .. | 13/15/0 | 0/0/0 |
| Pipe ..... | 14/0/0 | 0/0/0 |
| ZINC—English sheet .....ton | 26/10/0 | 0/0/0 |
| Vieille Montagne..... | 27/0/0 | 0/0/0 |
| TIN—Straits .... | 90/10/0 | 91/0/0 |
| Australian .... | 90/10/0 | 91/0/0 |
| English Ingots | 94/0/0 | 94 10/0 |
| **OILS.** | | |
| Linseed .....ton | 19/12/6 | 19/17/6 |
| Cocoanut, Cochin | 27/10/0 | 28/0/0 |
| Do. Ceylon ..... | 24/5/0 | 24/10/0 |
| Palm, Lagos .... | 24/10/0 | 0/0/0 |
| Rapeseed, English pale ..... | 31/0/0 | 0/0/0 |
| Do. brown ..... | 29/10/0 | 29/15/0 |
| Cottonseed ref... | 19/15/0 | 0/0/0 |
| Oleine ..... | 0/0/0 | 0/0/0 |
| Lubricating, U.S. | 4/10/0 | 5/10/0 |
| Do. refined ..... | 6/6/0 | 11/0/0 |
| TAR—Stockholm barrel | 0/19/6 | 1/0/0 |
| Archangel .... | 0/12/0 | 0/12/6 |

## TENDERS.

**[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]**

BROADSTAIRS.—For alterations and additions, "Burgate," St. Peter's Park, for Mrs. H. M. Ritchie. Messrs. Langham & Cole, architects, Broadstairs and Ramsgate:—

| | |
|---|---|
| J. E. Barwick ..... £227 | J. T. May (accepted) ..... £158 |

CARDIFF.—For erecting cottages, Dynas Powis, near Cardiff. Mr. W. H. D. Caple, architect, Cardiff:—

| | | | |
|---|---|---|---|
| H. Welsh ..... | £7,790 0 0 | Frank Ashley ..... | £6,704 3 2 |
| Stephens, Bastow, & Co. ..... | 7,729 0 0 | Executors of W. Gradwell ..... .. | 6,246 11 0 |
| Evans & Philips .... | 7,580 15 8 | Rutter & Meager.. | 6,225 14 9 |
| Jenkins & Arnold .. | 7,244 16 0 | Venning Bros. .... | 6,223 14 2 |
| E. J. Juce ..... | 6,727 1 0 | W. Rees* ..... | 5,609 0 8 |

* Accepted.

FITTLEWORTH (Sussex.)—For the erection of butcher's shop, &c., at Fittleworth, Sussex, for Mr. William Squire. Mr. W. H. Gr tten, architect:—

| | | | |
|---|---|---|---|
| Wallis .... ..... | £415 0 | R. Cook & Son ..... | £395 0 |
| Wadey & Son ..... | 399 0 | Winsdale.... ..... .. | 370 0 |
| Ayling ..... | 397 0 | R. Chamberlain, Petworth* | 358 18 |

* Accepted.

IPSWICH.—For the erection of a public urinal, for the Corporation. Mr. E. Buckham, Borough Surveyor:—

| | |
|---|---|
| Stearn & Son ..... | £116 0 0 |
| Crisp & Smith (accepted) ..... | 110 12 6 |
| Gibbons ..... | 105 0 0 |

LONDON.—For making up and paving the undermentioned roads, for the Vestry of the Parish of Fulham. Mr. W. Sykes, New Streets Surveyor:—

| — | Nowell & Robson. | T. Adams. | Tomes & Wimpey. | Rogers & Co. | Mowlem & Co. | Imperial Stone Co. |
|---|---|---|---|---|---|---|
| | £. | £. | £. | £. | £. | £. |
| Furness-road:— | | | | | | |
| Roadway ..... | 213 | 230 | 264 | 220 | 247 | — |
| York paving ..... | — | 105 | 106 | — | 106 | — |
| Victoria stone..... | — | 91 | 100 | — | 106 | — |
| Imperial stone ..... | — | 85 | 95 | — | 91 | 75 |
| Tasso-road:— | | | | | | |
| Roadway ..... | 593 | 508 | 446 | 507 | 631 | — |
| York paving ..... | — | 273 | 262 | — | 286 | — |
| Victoria stone..... | — | 236 | 248 | — | 284 | — |
| Imperial stone ..... | — | 227 | 234 | — | 245 | 217 |
| Whittingstall-road, Sec. II.: | | | | | | |
| Roadway ..... | 349 | 365 | 327 | 388 | 414 | — |
| York paving ..... | — | 153 | 160 | — | 165 | — |
| Victoria stone..... | — | 135 | 152 | — | 165 | — |
| Imperial stone ..... | — | 130 | 144 | — | 142 | 127 |
| Adeney-road, Sec. I.:— | | | | | | |
| Roadway ..... | 580 | 545 | 472 | 573 | 610 | — |
| York paving ..... | — | 291 | 285 | — | 290 | — |
| Victoria stone..... | — | 252 | 270 | — | 290 | — |
| Imperial stone ..... | — | 233 | 255 | — | 234 | 231 |
| Dilston-parade:— | | | | | | |
| York paving ..... | — | 108 | 84 | — | 131 | — |
| Victoria stone..... | — | 93 | 80 | — | 131 | — |
| Imperial stone ..... | — | 88 | 76 | — | 115 | 75 |
| Rosebury-road:— | | | | | | |
| Roadway ..... | 892 | 805 | 919 | 837 | 943 | — |
| York paving ..... | — | 396 | 376 | — | 401 | — |
| Victoria stone..... | — | 343 | 356 | — | 401 | — |
| Imperial stone ..... | — | 345 | 336 | — | 321 | 295 |

LONDON.—For providing and fixing joiners' work to residential chambers, Park-place, St. James's, for Mr Stanley G. Bird:—

| | | | |
|---|---|---|---|
| Hellis & Turner .... | £3,477 0 0 | D'Oyly's Joinery Works, Limited.. | £2,360 0 0 |
| John Parker ..... | 3,504 0 0 | Schavien & Co. .... | 2,358 0 0 |
| Foster & Dicksee .. | 3 495 0 0 | J. Valentine Inwood ..... | 2,238 0 0 |
| C. M. Henry ..... | 3 136 0 0 | James Sorrell & Co. | 2,193 0 0 |
| R. Pink..... | 2 905 0 0 | E. P. Bulled & Co... | 2,159 0 0 |
| Treasure & Son .. .. | 2,795 0 0 | J. A. Hingston .... | 2,159 0 0 |
| W. H. Simonds .... | 2,780 0 0 | J. T. Chappell .... | 2,120 0 0 |
| F. J. Saunders .... | 2,744 0 0 | Peacock Bros..... | 2,095 0 0 |
| Stephens, Bastow, & Co. ..... | 2,660 0 0 | F. Stevens ..... | 2,077 5 6 |
| Spencer & Co..... | 2 649 0 0 | A. Kellett ..... | 2,063 14 0 |
| Smith & Sons ..... | 2 645 0 0 | Rees, Blight, & Co.. | 1,941 0 0 |
| The Midland Joinery Co. ..... | 2,563 0 0 | H. J. Carter..... | 1,887 0 0 |
| | 2,400 0 0 | | |

LONDON.—For alterations and additions to the "White Hart" Hotel, Goswell-road, E.C., for Mr. J. E. Casham. Mr. J. T. Alexander, architect. Quantities by Mr. H. R. Messenge:—

| | | | |
|---|---|---|---|
| T. L. Green ..... | £4,297 | Jarvis & Sons ..... | £3,800 |
| Shurmur ..... | 3,960 | Patman & Fotheringham | 3,647 |
| Mattock Bros..... | 3,930 | Edwards & Medway .... | 3,613 |
| J. Auley..... | 3,871 | Fagg ..... | 3,533 |
| W. D. Palmer ..... | 3,870 | Walker Bros. ..... | 3,500 |

LONDON.—For new drainage and playground works at the Shapster School, Kingsland, for the School Board for London. Mr. T. J. Bailey, Architect :—

| | | | |
|---|---|---|---|
| Davis Bros. | £2,219 | William Neil | £1,203 |
| M. Marsland | 1,515 | G. J. Kick, Bromley-road, Beckenham* | 1,154 |
| Norris & Luke | 1,410 | | |
| McCormick & Sons | 1,348 | | |

* Recommended by the Works Committee for acceptance.

LONDON.—For the construction of either one or two sludge-vessels, for the London County Council. Mr. A. R. Binnie, Chief Engineer :—

| | For one ship. | For two ships. |
|---|---|---|
| D. Rowan & Son | £31,000 | £61,500 |
| Lobnitz & Co. | 31,000 | 61,500 |
| Palmer's Shipbuilding and Iron Co. | 28,250 | 55,550 |
| Napier, Shands, & Bell | 27,000 | — |
| R. Stephenson & Co., Limited | 26,500 | 52,550 |
| The Naval Construction and Armaments Company | 26,500 | 52,500 |

[These tenders were referred to the Main Drainage Committee for consideration and report.]

LONDON.—For the erection of a lodge, &c., at the North Woolwich Gardens, for the London County Council. Mr. Thomas Blashill, Architect :—

| | | | |
|---|---|---|---|
| F. J. Gorham | £1,200 | Benjamin & Robinson | £848 |
| T. Lapthorne & Co. | 995 | G. Lunn & Son | 710 |
| A. Wallis | 969 | E. Proctor | 700 |
| J. Garrett & Son | 867 | | |

LONDON.—For repairs and decorations to St. Sepulchre's Church, Holborn-viaduct. Messrs. A. & A. E. Billing, architects, Tooley-street :—

| | | | |
|---|---|---|---|
| Holland & Greenwood | £2,867 | Downs | £2,337 |
| Ansell | 2,745 | Lister | 2,250 |
| Palmer | 2,489 | J. Lidstone & Son (accepted) | 2,210 |

LONDON.—For the erection of new premises in High Holborn, W.C., for Messrs. Kelly & Co. Mr. Alfred M. Butler, architect, 16, Finsbury-circus, E.C. Quantities by Mr. Geo. Fleetwood, 15, Furnival's-inn, E.C. :—

| | | | |
|---|---|---|---|
| B. E. Nightingale | £14,264 | J. M. Macey & Sons | £13,628 |
| Holloway Bros. | 13,910 | G., H., & A. Bywaters | 13,566 |
| Colls & Sons | 13,888 | E. Laurence & Sons | 13,483 |
| Ashby Bros. | 13,880 | W. Scrivener & Co.* | 13,423 |
| Hall, Beddall, & Co. | 13,756 | | |

* Accepted.

LONDON, E.C.—For rebuilding 57, 58, 59, and 60, Friday-street, Cheapside. Mr. Delissa Joseph, architect, 17 and 18, Basinghall-street, E.C. :—

G. H. & A. Bywaters (accepted) ..... £12,281 0 0

LONDON.—For the erection of a carriage manufactory in the High-road, Chiswick, for Henry Whitlock, Limited. Quantities by Mr. H. Reginald Messenger :—

| | | | |
|---|---|---|---|
| Holloway Bros. | £3,994 | John Barker & Co. | £3,797 |
| Woodward & Co. | 3,935 | Patman & Fotheringham | 3,733 |
| L. H. & R. Roberts | 3,928 | Adamson & Sons | 3,635 |
| Leslie & Co. | 3,848 | Pink, Fryer, & Co. | 3,494 |

LONDON.—For rebuilding and finishing the "Sea Lion" public-house, Wootton-street, Lambeth, S.E., for Messrs. Whitbread & Co., Limited. Mr. Arthur Dixon, architect to the Company. Quantities not supplied :—

| | | | |
|---|---|---|---|
| W. H. Lascelles & Co. | £1,638 | Thos. Gregory & Co., Clapham Junction* | £1,447 |
| R. E. Worsley & Co. | 1,520 | | |

* Accepted.

LONDON.—For alteration at No. 44, Clipstone-street, W., for the Committee of the German Young Men's Christian Association. Messrs. Tolley & Sons, architects :—

| | | | |
|---|---|---|---|
| Lamble | £604 10 | Marriage | £418 0 |
| Gould & Brand | 456 0 | Croaker (accepted) | 380 0 |

LONDON.—For alterations and repairs to "The Olive Branch" public house, 223, Gray's Inn-road, for Mr. Thomas Saint :—

| | | | |
|---|---|---|---|
| Johnson & Manners | £873 | Gould & Brand | £647 |
| Thos. Warne | 800 | All-n & Sons | 638 |
| John Sayer | 690 | Hayworth & Sons | 611 |

LONDON.—For alterations and additions to the "Castle" public-house, Old Kent-road, S.E., for Mr. F. J. Shepherd. Mr. J. T. Alexander, architect. Quantities by Mr. Thomas T. Fife :—

| | | | |
|---|---|---|---|
| Bright & Co. | £3,975 | Edwards & Medway | £3,280 |
| Godson & Son | 3,391 | Fagg | 3,273 |
| J. Anley | 3,340 | Pinnock | 3,240 |
| Williams & Richards | 3,340 | W. D. Palmer | 3,150 |
| Mattock Bros. | 3,333 | Courtney & Fairburn | 3,081 |

LONDON.—For additions to "The Hive," Anson-road, Tufnell-park, for Mr. E. F. Bradley. Messrs. Truefitt & Truefitt, architects, 5, Bloomsbury-square, W.C. :—

| | | | |
|---|---|---|---|
| Stanley G. Bird | £352 10 | R. D. Lown & Sons* | £247 10 |
| J. Hunt | 297 0 | | |

* Accepted.

LONDON.—For new drainage work at 405 and 407, Holloway-road, for the London and South-Western Bank, Limited. Messrs. Truefitt & Truefitt, architects, 5, Bloomsbury-square, W.C. :—

| | | | |
|---|---|---|---|
| G. Stuart | £179 | J. Hunt* | £132 |
| R. D. Lown & Sons | 152 | | |

* Accepted.

LONDON.—For additions to No. 434, Holloway-road, for Mr. F. Matthews. Messrs. Truefitt & Truefitt, architects, 5, Bloomsbury-square, W.C :—

J. Hunt ..... £230 0 0

[No competition.]

MALVERN.—For erecting Manager's residence, for Messrs. J. Schweppe & Co., Limited, in connexion with their Colwall Factory. Quantities by Messrs. Morris Evans, & Son, 7, John-street, Adelphi. Messrs. Truefitt & Truefitt, architects, 5, Bloomsbury-square, W.C. :—

J. Wood & Sons, Worcester ..... £1,200 0 0

[No competition.]

MARGATE.—For the erection of house and stable, for Mr. John W. Dottridge. Mr. Leonard V. Hunt, architect, 35, Queen Victoria-street, E.C. :—

Joseph Brown & Son, Margate (accepted) ..... £1,100 0 0

RAMSGATE.—For alterations and additions, "Artillery Arms," for Mr. J. Coleman. Messrs. Langham & Cole, architects, Ramsgate :—

| | | | |
|---|---|---|---|
| C. Home | £275 | W. W. Martin | £220 |
| H. Bowman | 223 | C. J. Luff* | 220 |
| Newby Bros. | 220 | | |

* Accepted.

ST. HELEN'S (Isle of Wight).—For providing and laying a cast-iron water-main, for the Local Board. Mr. W. J. Hodgson, surveyor, High Park, Ryde :—

| | | | |
|---|---|---|---|
| T. Hall | £1,347 12 6 | G. Hoyles | £1,080 0 0 |
| G. Gibson | 1,245 0 0 | Hy. Dowty | 1,070 17 6 |
| J. Pockthall | 1,100 0 0 | G. C. Wheeler, Ryde* | 1,012 10 0 |
| J. Barton | 1,094 0 0 | | |

* Accepted.

SOUTHEND-ON-SEA.—For alterations and additions to "The London Hotel," Southend-on Sea, for Messrs. Brown Bros. Mr. H. C. Marston, surveyor, Walthamstow :—

| | | | |
|---|---|---|---|
| S. Goodall | £5,682 | J. & H. Coxe | £4,770 |
| Drew & Cadman | 5,157 | Turtle & Appleton | 4,644 |
| W. Shurmur | 5,133 | S. Darke & Son | 4,530 |
| Dupont | 4,995 | W. H. Lascelles | 4,497 |
| J. Vears & Co. | 4,906 | Baslen & Wiseman, Southend (accepted) | 4,496 |
| J. Holland | 4,898 | | |

SUNNINGDALE.—For the erection of servants' hall at Broadlands, for Mr. C. D. Kemp Welch. Messrs. Truefitt & Truefitt, architects, 5, Bloomsbury-square, W.C. :—

Norris & Son ..... £284 0 0

[No competition.]

SUNNINGDALE.—For new dairy at Broadlands, for Mr. C. D. Kemp Welch. Messrs. Truefitt & Truefitt, architects, 5, Bloomsbury-square, W.C. :—

Norris & Son ..... £119 0 0

[No competition.]

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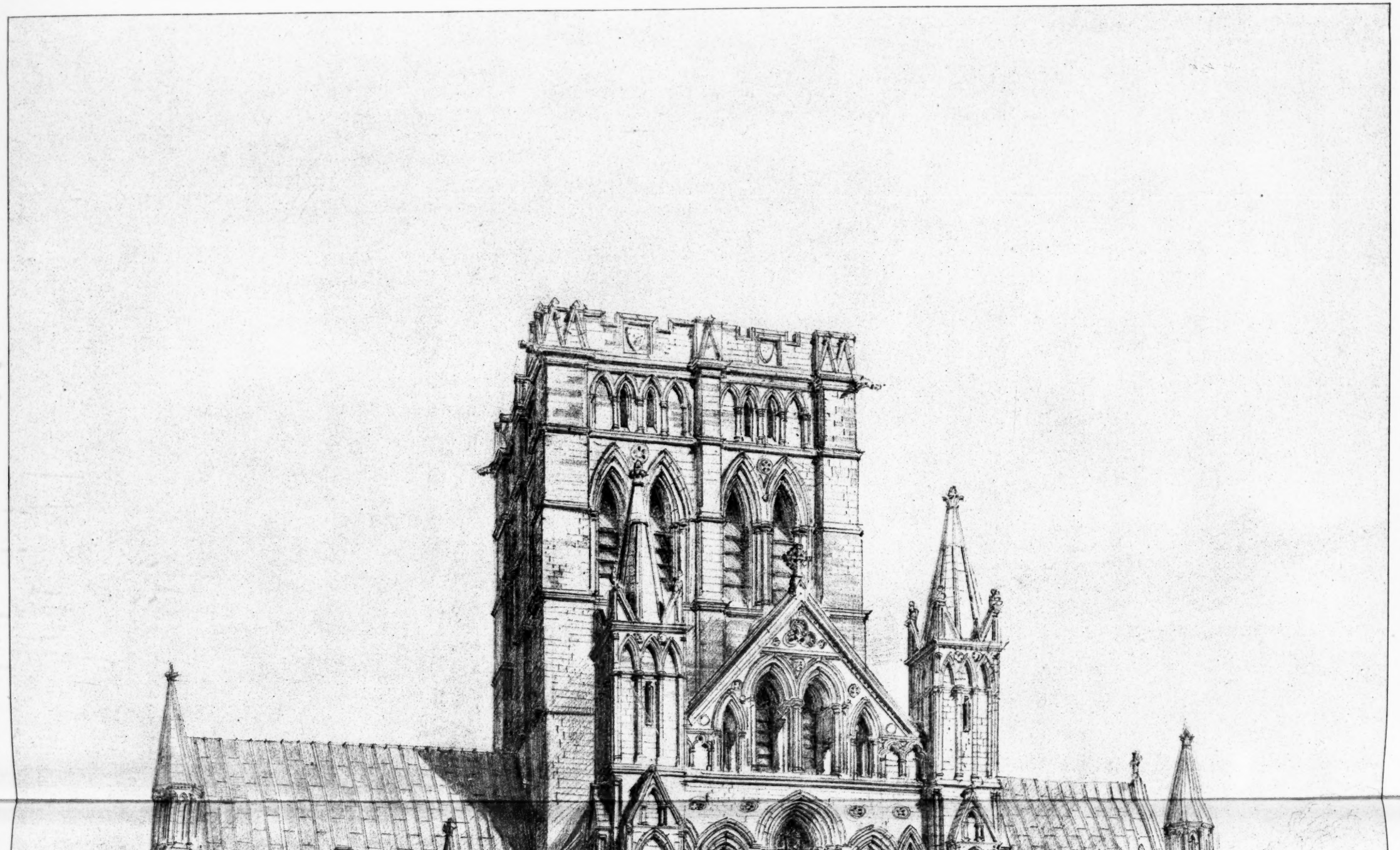

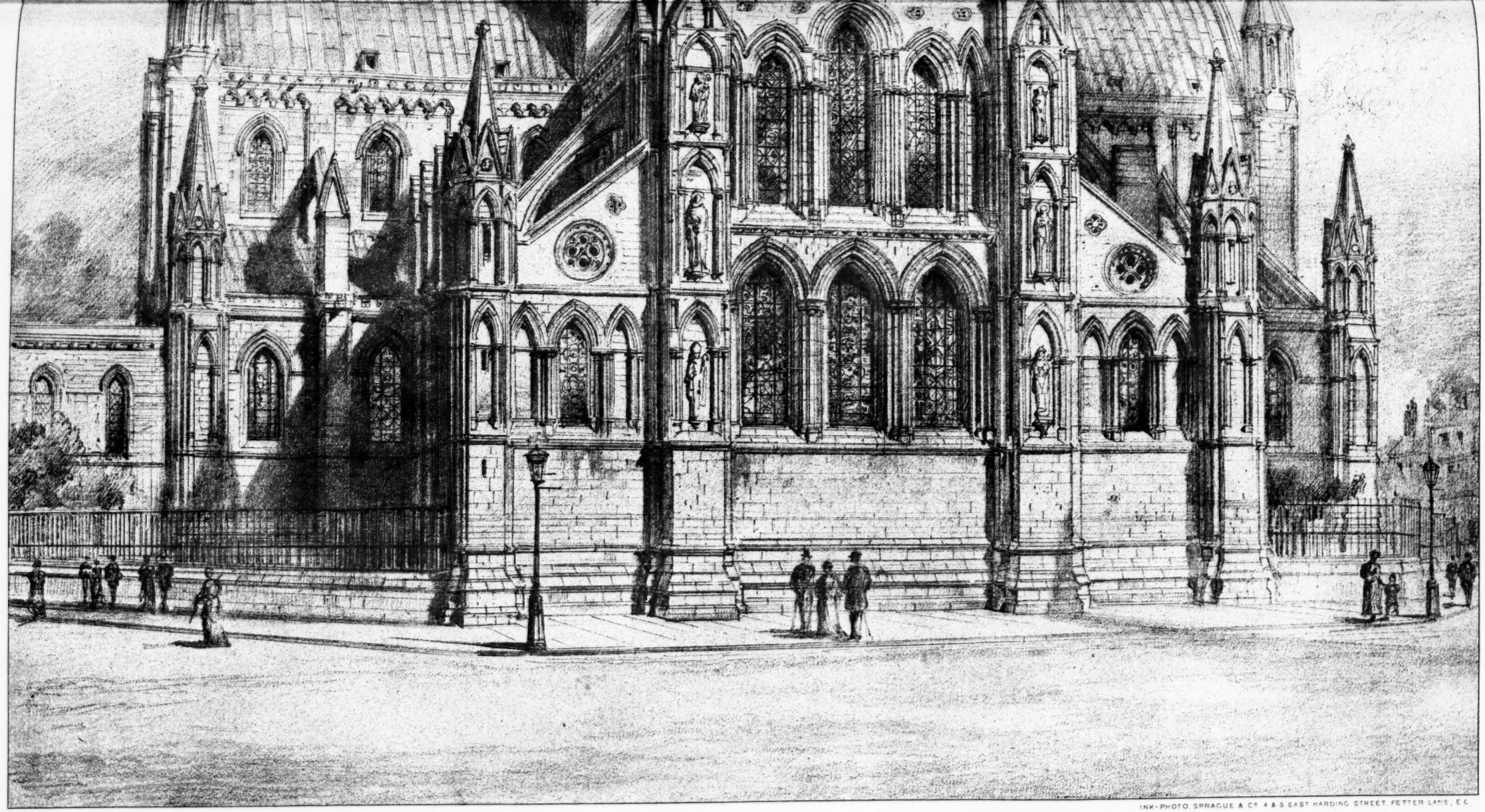

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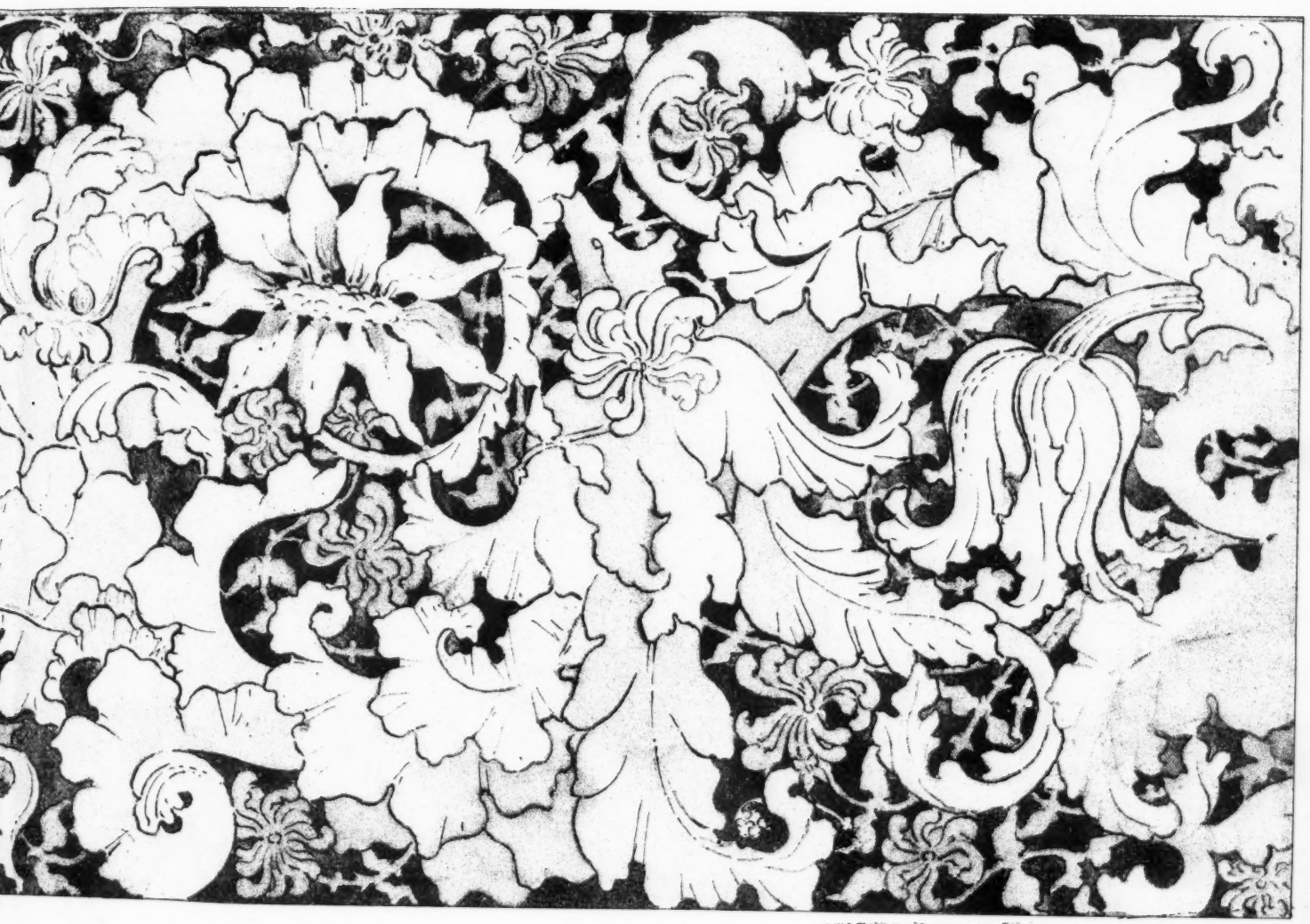

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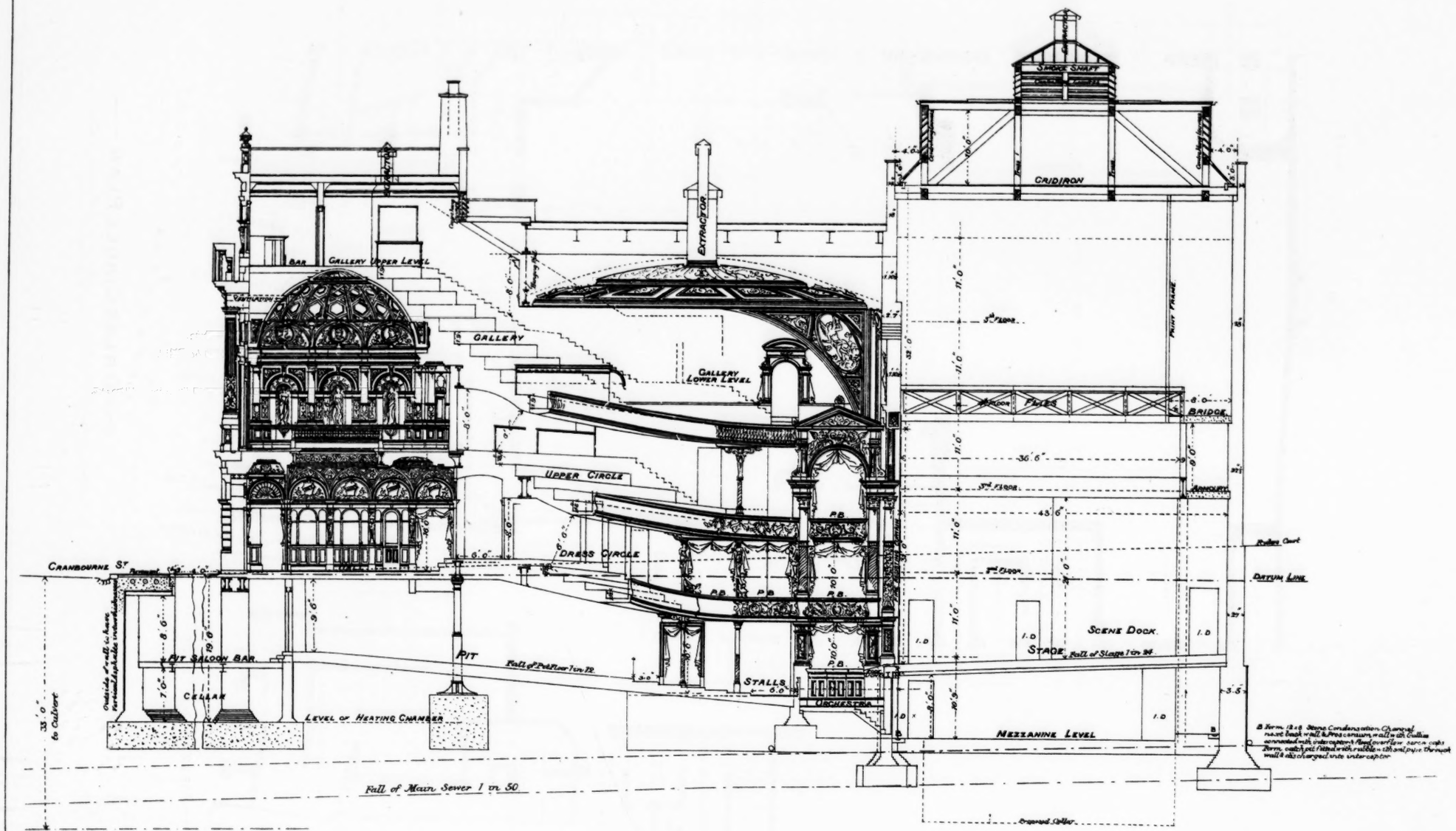


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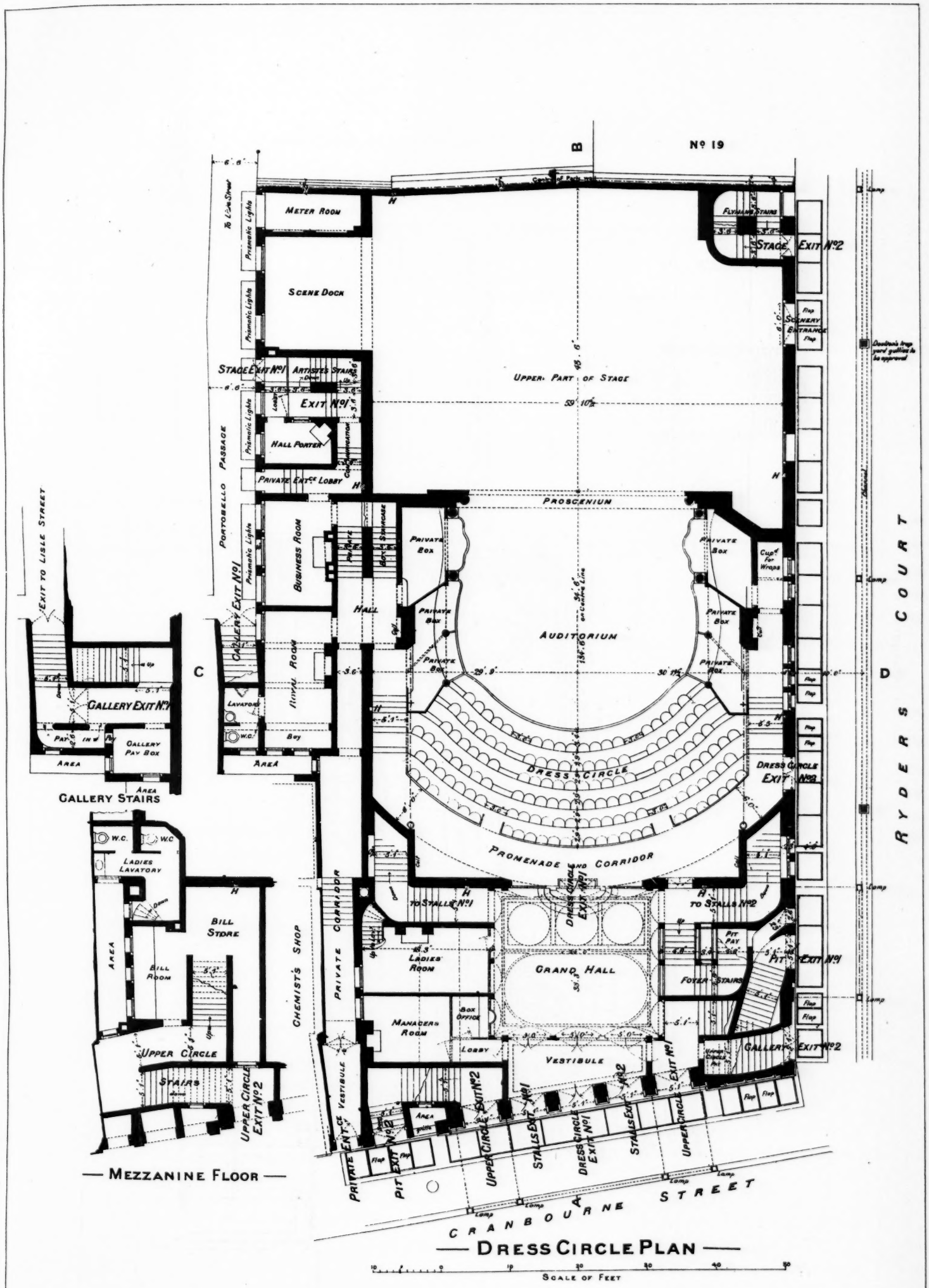


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